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N. S. E.

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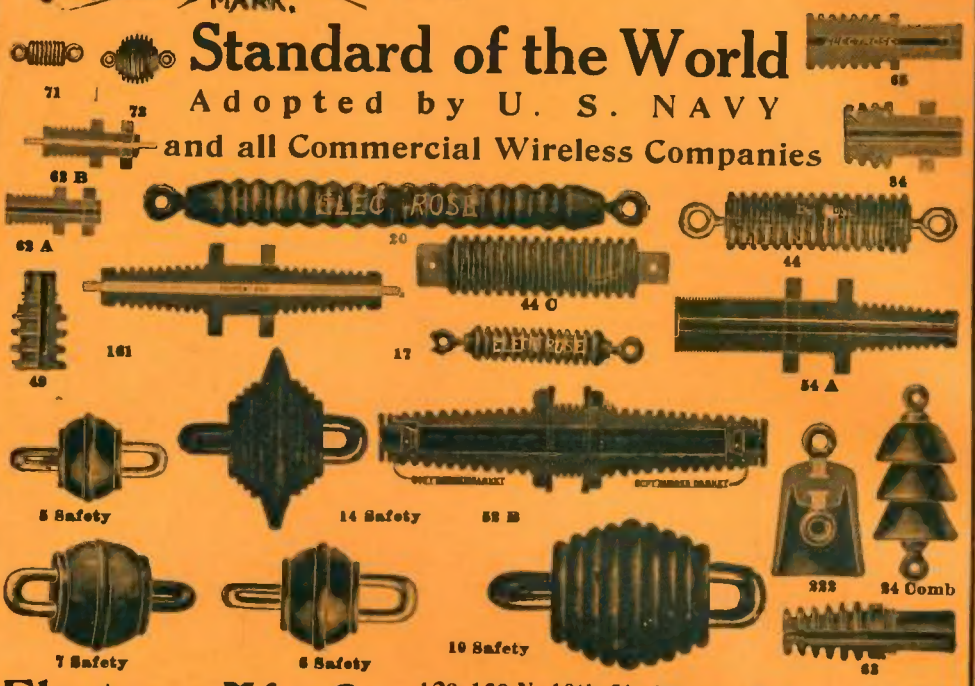

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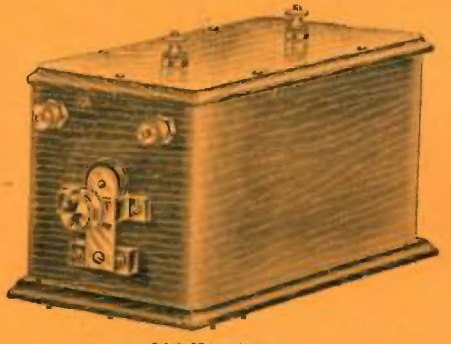

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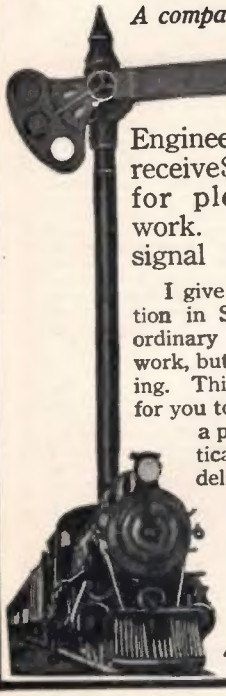

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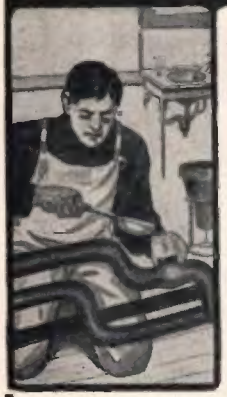

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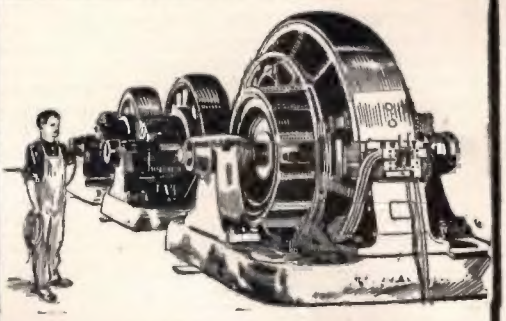

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Modern Electrics

VOL. IV. OCTOBER, 1911. No 7.

The Practical Electrician

A Popular Course in Electricity on the Construction of Electrical Apparatus and Experiments to be Conducted with them

By PROFESSOR W. WEILER, of the University of Esslingen, (Germany)

Translation by H. GERNSBACK

CHAPTER I.—Continued.

47. THERMO ELECTRIC CELLS. (Continued.)

AS antimony and bismuth are very brittle, although it is not very hard to make thin rods by casting ten parts of bismuth and one part of antimony, or perhaps an alloy of equal parts (antimony and cadmium), we can make an element which is more suitable for laboratory purposes, giving a fairly good current as follows:

Figures 48 and 49 show this element composed of copper and german silver wire, or copper and climax wire, thickness of the wire to be about No. 10 or No. 12 B. & S. The length is about ten inches. Take about thirty pieces of each kind and clean the ends well with emery paper, and connect two different pieces together with copper or german silver wire, and over this solder with very little tin. There is always a german silver wire followed by a copper wire and there will be two ends, one of copper wire and one of german silver wire. If the connections can be soldered with silver, or the ends brazed together with an oxy-hydrogen flame, the element will be much better.

The chain as shown in Fig. 49, is now placed on a metal tripod, which in order so as not to short circuit the chain, is covered with an asbestos circle with its center cut out. On top of the chain a round disc of asbestos is placed, covering the entire chain. The top disc is not shown in Fig. 49 but it is to be noticed that the connection ends project over the tripod, which is necessary in order to cool them. For this reason, the top asbestos disc should not be covered nor the outside connection. Underneath the tripod, in the center we now place a good alcohol lamp, or better, a Bunsen burner, which heats up the center connections.

We could place on top of this combination a second chain and perhaps a third and a fourth, putting all the chains in series or also in parallel; the former arrangement giving us high voltage and small amperage, while the second arrangement would give us high amperage and low voltage.

Fig. 48.

LAWS: The voltage increases the same as with a galvanic battery with the amount of the connected couples and for our arrangement each couple will give about 1-12 volts, in other words, to get one volt we require 12 couples.

Fig. 49.

The amperage increases with the mass of the metals; one of our couples as described gives about one-third ampere, and inasmuch as the chain is connected in series, the entire arrangement cannot give more than one-third ampere.

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For experimental work a very cheap as well as easy to construct thermo-element, may be made by using empty thread spools, as shown in Fig. 50.

Fig. 50

At the outer edges, drill as many small holes as possible just large enough to push the wires through. If we now place one end with the connections on a piece of blotting paper, and if we moisten this with water, a fine galvanometer will show a current which is produced by the difference of temperature between the lower part of the thermo element and the top part. By putting some ice on the bottom, instead of the wet blotting paper, a stronger current will be the result.

Fig. 51 shows the first thermo-couple invented by Seebeck. It is made of a pedestal on top of which is placed a copper plate about one inch wide and six

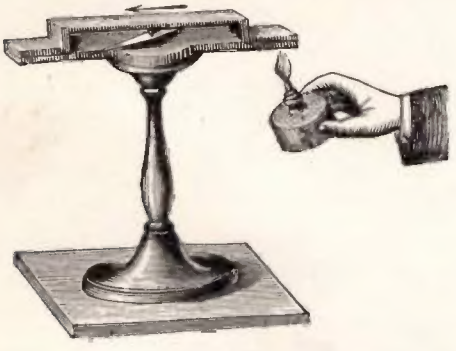

Fig. 51

inches long. On top of this a piece of german silver sheeting, bent as shown, is placed, and the two metals are soldered together at the point where they touch.

In the open space a small compass, or better, a compass needle is placed and if now one side is heated with a small alcohol lamp, the needle will be deviated, proving an electric current.

Quite powerful thermo elements have been produced, and Fig. 52 shows one of them. As may be seen this is used for commercial work and is heated by means of coal. Instead of having soldered connections, the pieces are bolted together in a unique manner and care has been taken so that no smoke will get between the metals, which would after a short while, result in a poor connection. The arrangement of this element is such that the cooling is done very rapidly which is quite essential; this arrangement resembles very much the radiators of a gasoline engine, both serving the same purpose. Such an element as shown

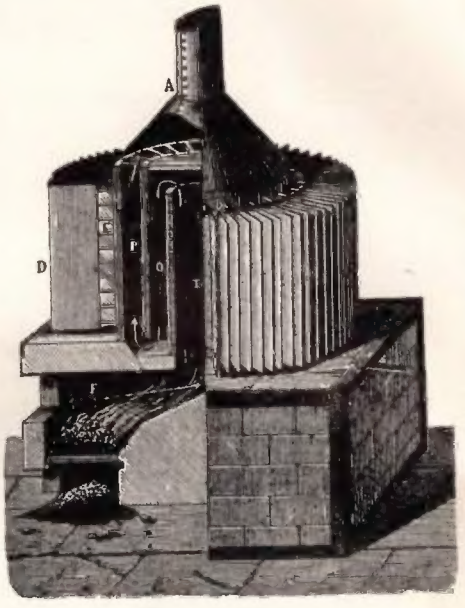

Fig. 52

furnishes about 40 amperes and about 6 volts.

Fig. 53 shows one of the very best thermo-elements ever constructed. It is heated by gas and the couples are made up of nickel and an antimony alloy. Each element consists of a small nickel tube which is the negative electrode and serves the double purpose to produce current and to carry the gas also. The prismatic positive electrode is cast around the negative electrode, and carries copper radiating plates, which are soldered to the positive electrodes.

The outfit shown in Fig. 53 comprises fifty elements and gives a current of three volts and three amperes. This current, at ordinary gas prices costs

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about five to eight cents an hour. In other words, only two per cent. of the energy used is transformed into electric energy, which goes to show that current produced by means of a thermo-element is perhaps the most expensive kind.

Fig. 54 shows a couple giving an absolutely constant current which is some-

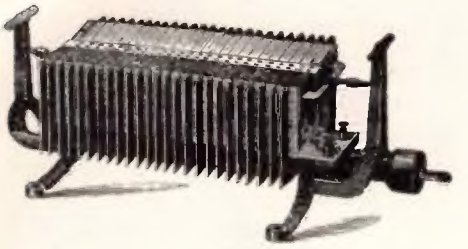

Fig. 53

times used in graduating galvanometers. It was used by Ohm, from which his famous law was derived.

The cast antimony rod (a), bent as shown in form of a U at its two ends, has two german silver wires, which are soldered as shown. The soldered ends are immersed in glass vessels of which (g) contains water, which is kept at a boiling point by means of a small spirit lamp as shown in cut. The glass vessel (G^1) contains small pieces of ice.

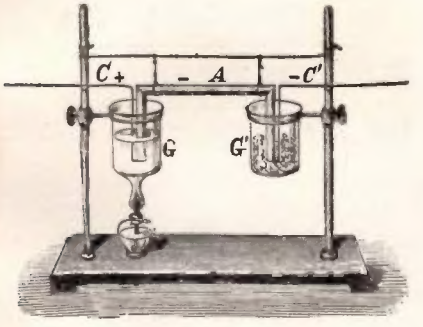

Fig. 54

The end in the boiling water becomes positive (+) and the other end negative (—).

48. CARBON ELEMENTS.

It has always been the dream of electricians to produce electricity out of carbon *directly;* thus even today our highly developed dynamos used in connection with steam engines only give back a very small amount of the total energy stored up in the carbon, as almost half of the energy escapes in wasted heat and smoke. In the ordinary batteries, using carbon it is of course understood that the carbon only acts as a conductor of the current and is not instrumental in producing any current itself.

Already in 1854 Grove asked himself if it was not possible, in order to produce electricity, to consume carbon from which to get electricity in a direct way. This of course would eliminate the expense of zinc and the expense of acid, which is now used to produce current. In other words, he wanted to consume the carbon in the battery instead of consuming the zinc.

A. C. Becquerel, in 1855, fused salpetre and also potash in a platinum crucible; he then took a piece of retort carbon and heated one end to a red heat. This heated end was now plunged in the

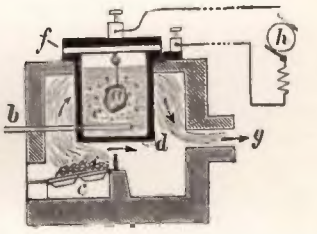

Fig. 55

fused salt; a short but powerful current was developed.

Bradley and Crocker, in 1888, fused permanganate of potash in an iron vessel which was used as the negative pole; a carbon plunging into the heated mass furnished the positive pole. If air was now blown into the fused salt, a current of about one volt was developed.

W. Jaques, in New York, in 1896, also blowed air through the tube b Fig. 55, which tube goes into a cast iron vessel f containing caustic soda e, which is kept in a molten state by the fire c. The smoke is let out at g. A carbon piece a, is insulated from the iron pot d and serves to take off the current. Jaques claims that with this arrangement he obtained 32 per cent. of the total energy, which, however, is doubtful.

Some scientists think the process in this element is purely electro-chemical; others think it is nothing but a thermo-electric element.

So far we have found, as sources of electricity, the chemical reactions and the heat. In the next chapters we will find

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how current is produced by means of the galvanic polarization, and induction in the moved magnetism.

49. CONCLUSION OF THE EFFECTS OF THE ELECTRIC CURRENT.

(a) Effects of the current produced in a conductor, through which it flows: Inner effects.

1. Heat and mechanical effects: The conductor becomes heated, expands and its resistance rises; with the exception of a carbon filament in which the resistance decreases when heated.

2. Light effects. The heating of the conductor can be raised to a white heat.

3. Chemical effects: For example, decomposition of the water inside or outside of the battery.

4. Physiological effects, i. e., such as the current produces on muscles and nerves, when passing through them.

(b) Effects which the current produces outside of its conductor; outside or distant effects.

5. Effects on other current circuits: Electro dynamic (electro mechanical) effects: Rotation apparatus.

6. Magnetic effects: Attraction and repulsion.

7. Effects on closed circuits: Inductive effects.

50. EFFICIENCY OF THE CURRENT.

LAW:

1. After Ohm's law $C = \frac{E}{R}$

2. The work W of a current is found, if one multiples the E.M.F. with the current (amperage). Thus W = ampere × volt; 1 V.A. per second = 1 watt.

3. The heating of a certain part of a circuit in a certain time (t) is equal after Joule's law, to the square of the current, multiplied with resistance $=C^2R\times t$ (Joule's heat).

The useful work $W_N = W - C^2R =$ entire work, less heating of the current circuit.

5. 746 watts = 1 horse power.

Example:

Suppose we have a battery producing a current of 25 volts, having an internal resistance of 15 ohms. Under which condition does it give the greatest amount of efficiency?

The outer resistance is taken as zero, in other words, the positive and negative poles are connected with a heavy short copper wire; then we have the following:

C = current $= \frac{25}{15} = 1.67$ ampere.

W = total work $=25\times1.67=41.75$ volt-ampere.

Now we connect in the circuit an outer resistance = 5 ohms; then we have:

$C= \frac{25}{15+5} = 1.25$ ampere.

$W=C\times E=1.25\times25=31.25$ volt-ampere.

$W_N = W - C^2R = 31.25 - 1.25^2\times15 = 7.8$ volt-amperes.

$G= W_N = \frac{7.8}{31.25} = 25$ per cent efficiency.

If we take the outer resistance equal to the inner, in other words, 15 ohms, we find:

$C= \frac{15}{15+25} = 0.833$ amperes.

$W=0.833\times25=20.825$ volt-ampere.

$W_N = W - C^2R = 20.825 - 0.833^2\times15 =$ 10.417 volt-amperes.

$G= W_N = \frac{10.417}{20.825} = 50$ per cent efficiency.

If we have an outer resistance of 30 ohms we have:

$C= \frac{25}{15+30} = 0.56$ ammeter.

$W=14$ volt-ampere.

$W_N = 9.42$ volt-ampere.

$G= \frac{W_N}{W} = 67$ per cent efficiency.

(To be Continued.)

ATTENTION OF DONALD DUNHAM.

The Wireless Association of America desires to express its thanks to you for replying to our appeal in the September issue of *Modern Electrics*. But we must again ask you to consider our request that you at once send your address to your mother, who is ill with anxiety. Go to the General Delivery for your letters.

ENFORCING THE WIRELESS LAW.

A proof that the wireless law recently passed will be rigidly enforced, was demonstrated in the case of Capt. Isaac Jones, of the British Steamer Templemore of the Johnston Line. A warrant was served on the captain for violating the law requiring wireless equipment to be used by all coastwise steamers carrying passengers. At the time the vessel had several passengers on board, which were not part of the regular crew.

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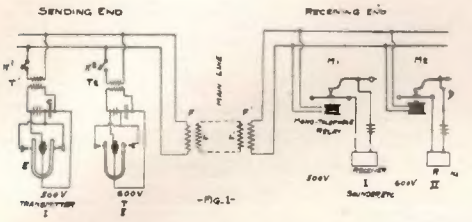
The Mercadier-Magunna Telegraph System

By A. C. Marlowe.

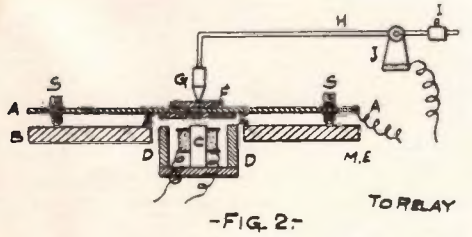
(Paris Correspondent, *Modern Electrics.*)

A PRACTICAL method for sending several messages at once over a telegraph line is one that will be welcomed now that the traffic over the lines has so much increased, and in the future some such method will undoubtedly need to be used. The new Mercadier-Magunna system claims to solve the problem, at least



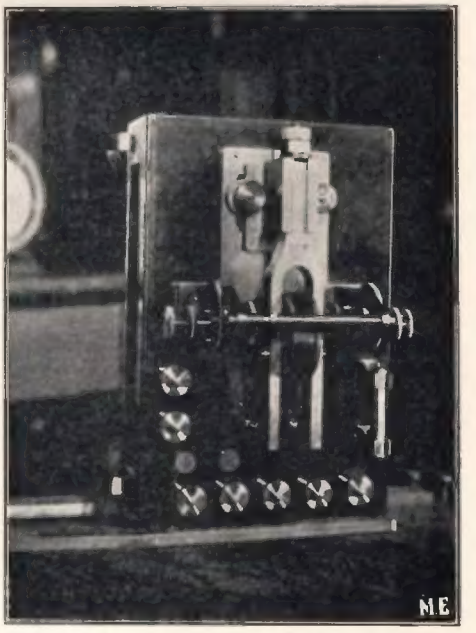
to a certain extent, seeing that four times as many messages can be now sent over the wire. Since the very successful tests made between Paris and Lyons some time ago, the new method has been attracting much attention in Europe, especially as it can be worked by telegraphers without needing any special training.

Suppose a tuning fork to be mounted at one end of a table. When struck, it gives out a note of a certain musical pitch, corresponding to say 500 vibrations per second. Should a second fork be mounted at the other end and exactly like the first one, it will respond faintly to the vibrations of the



-FIG. 2-

first fork, as is well known. But if the second fork represents another musical note it will not respond, and if we wish it to do so we must mount a like fork at the first end. In short, if four forks, A, B, C, D, are placed at one end and four corresponding forks at the other, fork A^1 will respond when A is struck and so on. Our readers are no doubt already familiar with such a selective system from preceding articles, and the same applies to electrically vibrated tuning forks. Two such forks are seen at the sending station (fig. 1) and at the receiving end are two tuned receivers which are used instead of forks in this case. It is well known that alternating currents are set up in the coil of the vibrating fork and these correspond to that particular pitch.



Transmitter Fork.

The transformer, T, and key, K, are used in each case. Transmitter, I, sends currents at 500 frequency and transmitter, II, at 600, etc. Receiver, I, acts whenever the 500 frequency current passes on the line, so that it selects out the Morse signals sent by key 1. Receiver, II, takes signals sent at 600 frequency by key 2, etc.

It is found best to use what the inventors call a mono-telephone relay at the receiving end, and it resembles a telephone very closely, except that it is tuned to respond for only one pitch. This is done (Fig. 2) by fixing a metal

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disc, A, upon the base, B, by three screws placed in a circle in such a way that no other vibrations can be

Monotelephone Relay.

set up except those of the pitch for which the disc is adjusted. Each disc is naturally tuned to a different pitch. When the proper current comes on, the mono-telephone gives out a loud note, but otherwise it is silent. The line current goes into the electro-magnet, C D, and it acts on a soft iron armature fixed to the main disc. Placing several mono-telephones on the line, the operators can read off the Morse signals by sound, and thus all the transmitters can be sending messages at once and each will reach the

Complete Station.

proper operator. However, the mono-telephone can be used as a relay to work a Morse sounder or tape writer. A contact piece, G, bears on a platinum disc, F, and the pressure is balanced by the arm, H, as shown. When at rest, there is contact between F and G, so that a sensitive relay in the local circuit is kept attracted. But when the disc vibrates, the part G H is too heavy to follow this movement, so that the contact is imperfect at F G, and the relay drops off to the other side and now makes contact for the sounder. In this way each message is received on its particular sounder.

Both stations naturally have sending and receiving instruments on this principle, but all the currents pass over the line without interfering, as they are of different pitch.

ANOTHER WIRELESS TELEPHONE.

An Englishman, Matthews, is preparing for extensive experiments with his system of wireless telephony. He proposes to use man lifting kites to talk a distance of 25 miles between Chepstow and Cardiff, England.

His outfit is said to be contained within a small box and consists principally of a battery, a motor, and a transformer, the whole weighing but twelve pounds. The cost is stated to be about $50 by the inventor. While the electricians are quite skeptic as to the value of the invention, the inventor displays the characteristic assurance of success.

THE ORIGIN OF "DEADHEAD."

The term "deadhead," is largely used in wireless and telegraphic transmission, and signifies "no charge." Probably few of our readers know of the origin of this term which they so often use and hear.

The "deadheads" originated in the famous city of Pompeii, Italy. Ivory slabs were used for tickets to the theatres, or rather amphitheatres. The slabs were marked with different signs, for instance, a bird meant that the holder was entitled to the top row seats, while the ones marked with small death's heads entitled the holder to free admittance.

Even in those days there were free passes! Hence the term "deadhead."

A GREEN WRAPPER

means your subscription expired. Better renew to-day and you won't miss important numbers.

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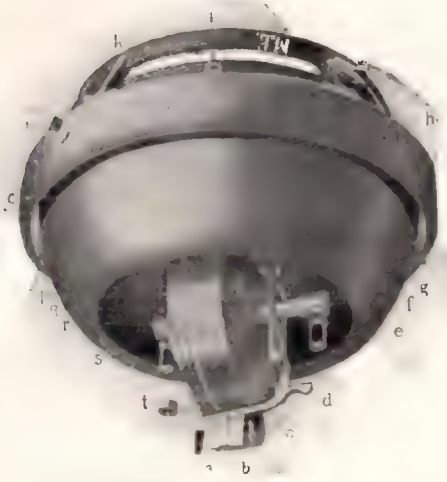
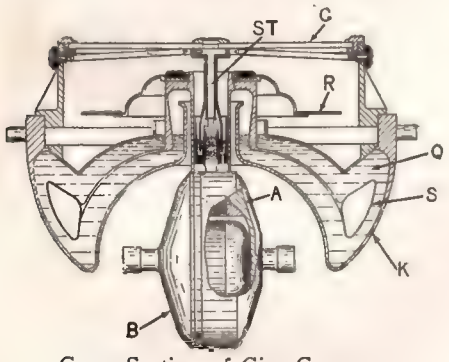
The Gyro-Compass

A COMPASS on an entirely new principle, has attracted much attention, and has proven very satisfactory in numerous tests.

This compass is the invention of Dr. Anschultz, of Kiel, Germany. It works on the principle that if an electric gyroscope is mounted so as to be free to move in two directions, it is found that its axis will always point North and South. However, this action is not noticeable in ordinary gyroscopes, for such must have good mountings and very high speed. The greatest advantage in the use of this new compass, is the fact that it is not affected by the surrounding iron masses.

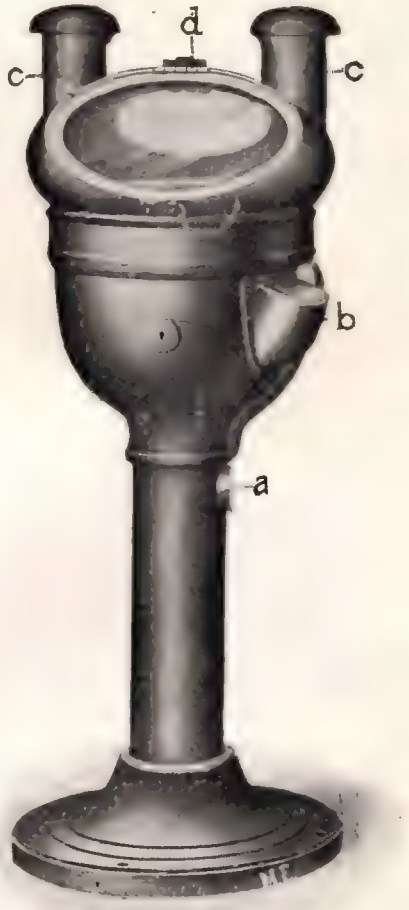


Outside View of Compass Proper.



Cross Section of Giro-Compass.

Looking at the diagram, which is a section of the compass, it will be noted that case B has a 3 phase motor gyroscope fixed below it. The float, S, is a hollow steel ring, floating in the pool of mercury, K. Above is the card, R, attached to the float and the axle of the gyroscope directly in line with the N-S line on the card. K is on gimbals as usual, and the outer gimbal ring is on springs to relieve the apparatus of shocks. The motor is a very small 3 phase affair, which has the enormous speed of 20,000 r. p. m., the rotor carrying the windings. The rotor is fastened to the gyroscope wheel.



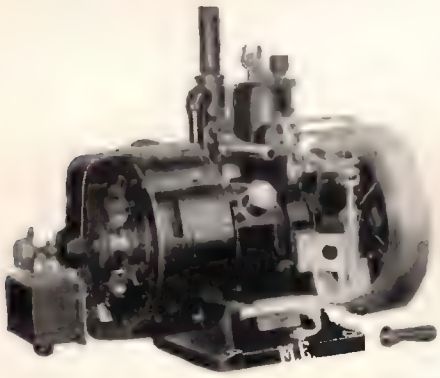
General View of Giro-Compass.

It has been tried with great success aboard the "Deutschland" and other ships. It is excellent for war-vessels, which have usually great difficulty with regular compasses owing to the amount of iron which they have. Aside from having been tried in Germany, it has likewise been tried in England.

New 1 K.W. Gasoline-Engine Generator Set

The 1 k.w. gasoline engine generator set designed for lighting plants in private residences, small hotels, rural railroad stations, farms, country estates, etc., is the latest addition to the regular line of 3, 5, 10 and 25 k.w. units of this class developed by the General Electric Company for use where commercial electric current is not available and water power is scarce.

This set comprises a single cylinder, vertical, two-cycle, water-cooled gasoline-engine direct connected to a 1 k.w. direct-current generator. The later is mounted on and overhung from the engine casing. The engine is provided with an overflow type of



carburetter and a suction gasoline pump for lifting the fuel from a tank placed underground and at a distance from the engine. The carburetter is provided with a means for taking hot air from the exhaust to assist in making gas in cold weather. This construction is in accordance with the requirements of the Underwriters' Laboratories, therefore, the set can be installed near or within insured buildings without invalidating the insurance.

The two main shaft bearings of the engine are lubricated by means of spring force feed grease cups. The bearings at both ends of the connecting rod and the cylinder walls are lubricated by the suction of oil into the engine with the vaporized gasoline. The oil is stored in a compartment of the carburetter and its supply is controlled by an adjustable needle valve with sight feed. All of the receptacles hold enough oil for over ten hours running at full load. The outboard generator bearing is a ball bearing packed with lubricant which requires no attention. The cooling is by thermo-siphon, no water pump being required. The governor is located in the engine flywheel and operates a throttle valve placed in the transfer passage between the crank case and the cylinder. Both engine and generator are built by the General Electric Company. They are designed to operate together, thereby giving complete units, which are necessarily superior to the usual type of belted or assembled combinations. They give very close regulation at all loads, are absolutely reliable in all respects, and lamps operated directly from them will not wink or flicker, and will burn with the same intensity whether only one lamp or the entire capacity of a set be lighted. They can be operated by any intelligent person much easier than an ordinary automobile engine, and practically require no attention other than the simple work of starting or stopping. In other words, their operation is practically automatic.

The overall dimensions are remarkably small—length about 2 feet 7 inches, height 2 feet 2 inches, width about 18 inches, and base about 13 by 14 inches. The total weight is 350 pounds.

These sets can be obtained with either 35, 65 or 125-volt flat-compound wound generators. The 35-volt set permits the use of a relatively small storage battery, if necessary for emergency lighting, but cannot be used for operating motors driving small industrial or domestic appliances. The 65-volt set is especially designed for marine installations, and is suitable for operating a 9-inch searchlight and rugged filament Edison Mazda lamps for running or signal lights, and cabin lights. The 125-volt set is suitable for all purposes—for general lighting and for the operation of small motors and electric heating and cooking appliances.

The Construction of an Ozone Generator

THE germicidal and deodorizing properties of ozone and the ease with which it may be produced electrically has caused the installation of ozone air purifiers on a large scale in many public buildings, especially libraries.

Ozone is an allatropic form of oxygen. Whereas oxygen atoms combine dually to form the oxygen molecule, the ozone molecule is formed by the oxygen atoms grouping into threes. However, the third atom that distinguishes ozone from oxygen, makes of the former a very unstable gas. It is this instability which gives ozone its desirable qualities.

An ozone molecule upon meeting with bacteria loses the superfluous atom which combines with the carbon of the germ, for which it has a great affinity, and destroys it completely by oxidation. Moreover, ozone imparts to stale air, a mountain-like crispness and freshness that is decidedly invigorating.

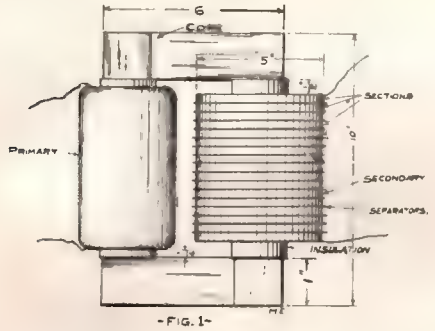


FIG. 1

An ozone generator that will give gratifying results, besides being comparatively easy to construct, is described herewith.

The assembled generator will be made up of three distinct parts: the high tension transformer, the discharging device and the circulating fan. They will be treated in this order.

The transformer should be constructed along the lines followed in building small wireless transformers, i. e., several layers of heavy wire wound as a primary on a "leg" of a closed iron core of the customary hollow rectangular shape; and the opposite leg wound as a secondary with a large number of turns of very fine wire. The great difference in ratio of turns will cause a high voltage at the secondary terminals.

The core should be built up to a thickness of one inch in the usual manner, of soft iron strips, one inch wide, so that, when assembled it will form a hollow rectangle measuring 10x6 inches. Each of the long sides will constitute a primary and a secondary leg, respectively, and should be wrapped with friction tape and 8 or 10 layers of oiled muslin or Empire cloth for insulation purposes.

The primary may now be wound on one of the legs and will consist of seven layers of No. 16 D.C.C. magnet wire. It should be well taped as otherwise the outside turns are apt to loosen and cause heating.

The secondary, of No. 34 enameled magnet wire, will consist of 20, five inch sections wound in the form of pancakes, one-quarter inch thick and impregnated in a boiling paraffine-beeswax compound till air bubbles cease to rise. The temperature of the boiling wax should never exceed 100 degrees C., or it will carbonize and lose its insulating value.

Upon impregnation the sections should be forcibly pressed between cold marble slabs. This insures uniformity and a penetration of the insulating mixture to the innermost turns of wire. In so doing, it prevents the entrance of moisture and its consequent detrimental effects.

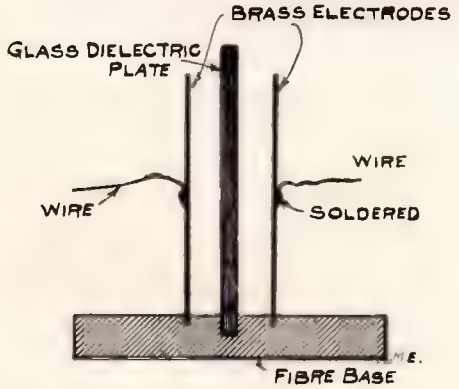
A square hole at the centre of the sections should be provided of such a size that they will fit snugly over the insulation of the other leg.

Upon assembling the sections over the core each one should be separated from the next by several 5½ inch Empire cloth discs. Particular care should be observed that all connections are well soldered—fluxed with rosin—and taped. The secondary upon completion, should be strengthened by pouring the boiling insulating wax into the crevices, till they are entirely filled and it is coalescent. This will assist materially in counteracting the detrimental effects of hygroscopic influences.

The assembled transformer will appear as in Fig. 1. It might be well to say here that this transformer may be used in connection with a wireless transmitting set and can be rated at 90 effective watts, or about 1-11 kilowatt with a transmitting range of 10 to 15 miles.

The discharging device is next to be considered. To ozonize air it is essential that a visible corona or "brush" discharge be produced. This takes the form of a violet glow and is always the index of an extremely high potential.

There have been many forms of discharger developed, among which the one treated herein is quite efficient and simple in construction. Two pieces of heavy sheet brass measuring 3x4 inches are placed in a horizontal position, one-quarter inch apart in grooves in a fibre base. Rubber should not be used as it carbonizes quickly under such stresses as it would be subjected to and wood has too low a dialectric strength. Between the brass pieces in another groove, at least one-quarter inch deep should be fitted a one-eighth inch sheet of plate glass measuring 4x5 inches.

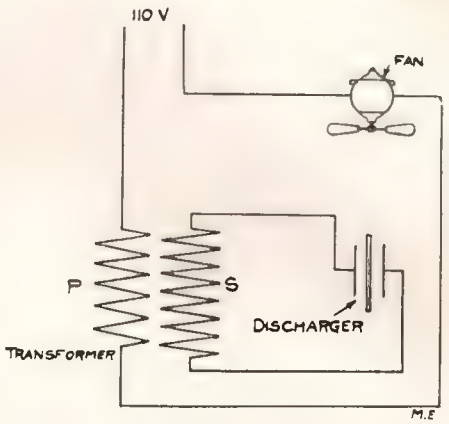


-FIG. 2-

The difference in potential of the two electrodes, which are connected to the secondary terminals of the transformer is sufficient to cause a heavy violet "brush" or corona discharge to form in the spaces between them and the dielectric. In these spaces enough ozonized air is produced to purify and freshen the air in a comparatively large room or hall.

The function of renewing the air between the electrodes and forcing the ozonized product out into the room is performed by a small alternating current fan. It should be placed several inches behind the discharger so that the air from it blows through the electrodes and out into the room.

The complete ozone generator may be mounted or cased at the option of the builder. It should be connected as shown in the diagram, Fig. 3.



-FIG. 3-

In operation the device will take less current than is consumed in an ordinary 32 c.p. carbon filament lamp. Alternating current only can be used and the transformer is so designed as to operate at any frequency from 50 to 130 cycles.

ANOTHER LONG DISTANCE RECORD.

Another record has been created with a one-inch coil, used on 110 volts, in series with a suitable resistance, Mr. E. Ferguson, on board the S. S. Victoria, plying between the Pacific Coast States and Alaskan ports, succeeded in covering ranges up to 250 miles with a one-inch coil which were afterwards officially acknowledged as correct.

The transmitter consisted of an ordinary one-inch coil, working on 110 volts, D. C., in series with three 32 c. p. lamps. No secondary condenser was used, nor the regular hook-up using a helix. One side of the spark gap was connected to the aerial while the other was connected to the ship's hull. The spark was about 1/32 inch long.

New Electrical Apparatus for Medical Purposes

WE are indebted to the Sanitas Company, of Berlin, Germany, for the accompanying photographs of a few of their latest appliances and apparatus.

In Fig. 1 we note one of the new types of cabinets for light treatment. It is equipped with banks of electric lamps which are regulated at the patient's desire.

In Fig. 2 is an adjustable table for placing a patient to be examined with the X-Ray apparatus. The tube is placed behind the board on which the patient lies, and the photograph shows the many adjustments which are possible with this useful apparatus.

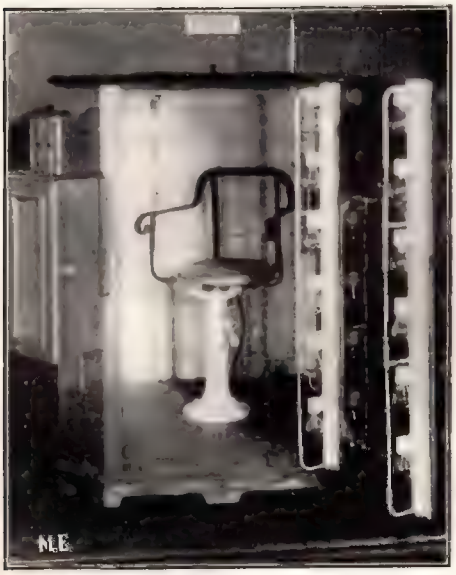


Fig. 1

Fig. 3 illustrates the latest X-Ray apparatus. The coil, regulating apparatus, the tube encased in an adjustable projector, and other features are perfectly noticeable. The tube is suspended with its container from the ceiling by means of fine cables, so that it may be brought to any distance from the patient. A sensitive dry photographic plate may be laid underneath the table, within a proper light proof covering, and thus photograph the penetrations of the X-Rays. An adjustable safety spark gap, graduated in centimeters is used on the coil, so that the insulation will not be strained unnecessarily. A mercury interrupter may be noticed on the wall just under the switchboard.

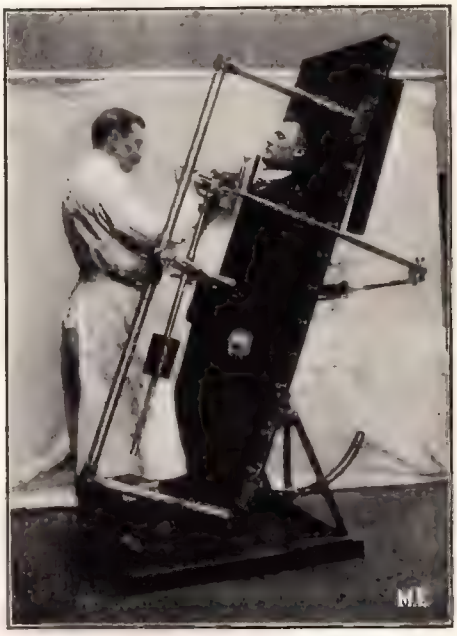


Fig. 2

Fig. 3

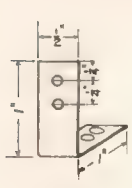
An Experimental Electric Furnace

By Lawrence C. Byck.

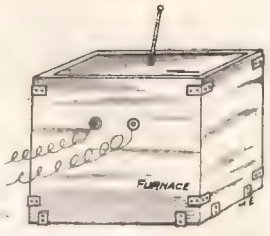
THE average experimenter who wants to use an electric furnace, finds the market price of this instrument prohibitive. By using the following suggestions, a very serviceable electric furnace of the resistance type can be made, which, under favorable conditions and intelligent management, will give temperatures up to 950°C (or over 1,700° F.). It is made to be used on regular lighting circuit of 110 or 220 volts, and the current consumed is largely dependent on the temperature you wish to maintain. It is necessary to use a rheostat of some kind in series with your furnace, to regulate the current, and thereby the temperature. A water rheostat will do very well, or even a bank of lamps if nothing more gradually adjustable is at hand.

The materials needed will be about as follows:

1 sq. ft. thin asbestos board, or
1 alundum tube 4" diam. x 6" long.
4-5 sq. ft. thicker asbestos board.
5 doz. small copper rivets.
2-3 lbs. asbestos wool.
2 binding posts, and lastly several feet of some standard resistance wire. There are a number of wires and ribbons (such as Nichrome, Calorite) made for this purpose, and you should get one of these. Do not use an ordinary resistance wire, as you will



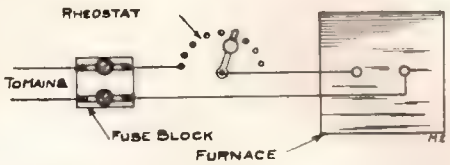
-FIG. 1-



-FIG 2-

never get high temperatures, they will burn out or oxidize, and will be ten times as costly in the end.

Before going into detail, I will roughly outline the construction and theory of this furnace. Your resistance wire will be wound around a tube large enough to easily contain the crucible you expect to use. This tube will be placed in an asbestos board box, upon a heavy layer of asbestos wool. The two ends of your wire will be attached to two binding posts on one side of the box, and the space between the tube (set upright)



-FIG. 3-

and the box will be packed with asbestos wool. A cover of asbestos board will cover the top.

If you are going to use the highest temperatures possible, you should have an alundum or porcelain (thin) tube, or else, after the whole furnace is completed and the asbestos wool tightly packed about the wire, wound on asbestos tube, withdraw the latter altogether, using a gentle twisting motion so as not to disturb the packing. If properly done this is best of all, as no heat will be lost.

To make an asbestos tube, cut a strip of the thin asbestos board, 6 inches wide. Soak it in water until just pliable. Then roll it around a cardboard tube about 4 inches in diameter, tie in place until dry and hard again and cement the edges where they meet. Wind the wire around this, leaving ¼ inch between turns and ½ inch at the top end. Leave about 7 inches of wire free at each end to make connections to.

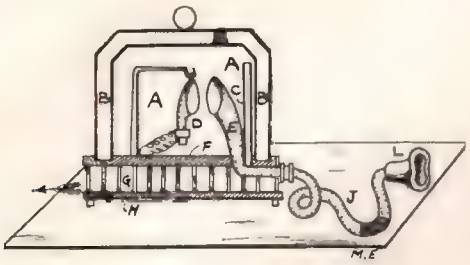
For a tube the size already mentioned the box ought to be about 10x 10x9. It will be made of asbestos board and the sides held together by cleats made from ½-inch copper or brass strip, made as follows: Cut 16 2-inch pieces from the strip, bore two holes just large enough to take the

(Continued on Page 433)

Paris Letter

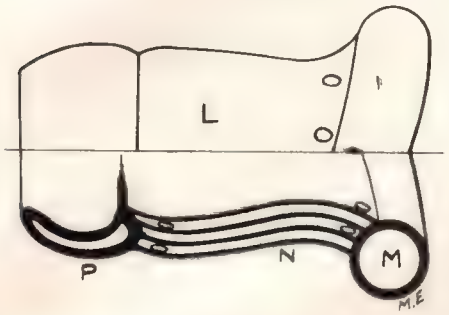
A SILENT TELEPHONE TRANSMITTER.

A simple device, whereby a person telephoning will not be heard by other



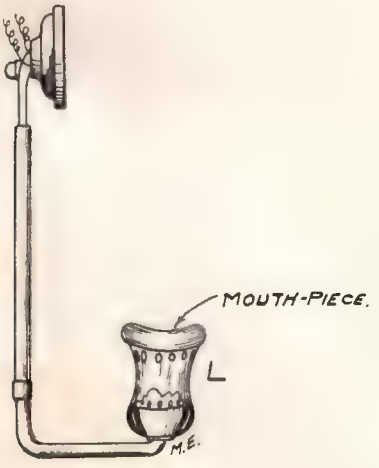
-FIG. 1-

parties in the immediate neighborhood, but will be heard plainly at the other



-FIG. 2-

end of the line, is illustrated in the diagram, Fig. 1.



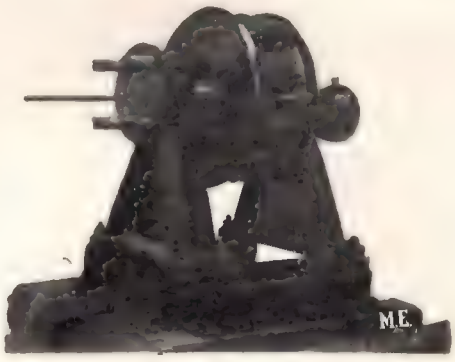
-FIG. 3-

The main chamber A, is surrounded by the vacuum chamber B, which has double walls. Tube C connects the main chamber with the spaces in the base, G. The holes connecting the small chambers G, are staggered, that is to say, one will be at the top, while the next one will be at the bottom. Telephone transmitter D is facing E, which connects with the mouthpiece L, by means of tubing J. L is shown in Fig. 2, and is made of many layers with vacuums between, so that sound cannot penetrate. Likewise with tubing J. Through the tube C, and chambers G, all the air pressure from the voice escapes, but the sound is lost. The mouth is placed tightly against the soft rubber mouthpiece L.

Fig. 3, shows a simplified form, but not quite as effective.

ELECTROMAGNETIC TESTING BRAKE.

The photograph shown herewith is of a new type of testing brake, employing the electromagnetic principle for producing the drag. Usually the prim-



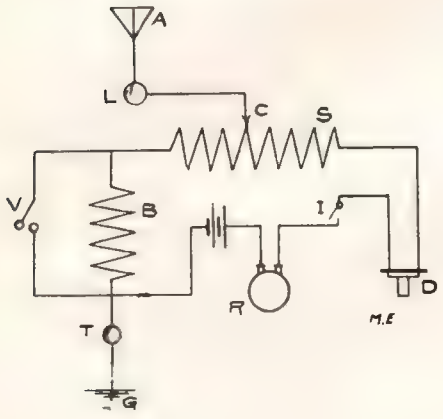
itive apparatus is resorted to, of using a split piece of wood tightly clamped on the shaft of the motive power to be tested, with a protruding wooden arm on which is fastened a spring balance. These systems have always proven unsatisfactory, and so the present electromagnetic brake testing device has been brought forward to largely overcome the faults of its predecessor. Instead of friction being exerted on the shaft, the shaft carries a series of aluminum arms with iron discs fastened on them, revolving in a field of a number of electromagnets, the current exciting

these being adjustable by electromagnets. A shifting weight on a long arm denotes the power exerted by the drag on the iron discs, and by simple calculations furnishes the horsepower figures.

A NEW HOOK-UP.

Signals from the Eiffel Tower in Paris, France, have been successfully heard in Switzerland, at Chaux de Fonds (the watchmaking center), by using the following hook-up, in which:

C S—Tuner.
I—Switch.
V—Switch.
P—2 Dry Cells.
D—Electrolytic Detector.
L—Aerial.
T—Ground.
B—Additional coil.
R—4000 Ohm Telephone.

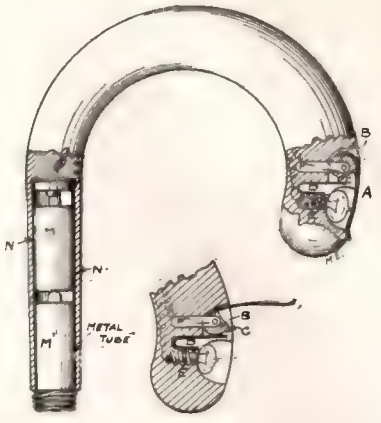


The coil, B, is practically a loading coil, and has 10,000 turns, so that long wave lengths may be obtained. The receiving aerial is 3000 feet above sea-level, and of the horizontal type, supported between two masts.

AN ELECTRIC LIGHT CANE.

A clever novelty has been brought forth in the shape of a cane containing batteries and an electric light, which is normally concealed by a cover. However, when the cover is raised, the lamp lights.

In the diagram, A, is a cover fastened to a metal piece, B, with a small ivory pin, C. D is a metal brush which makes contact with B, except when C separates the contact. E is the base of the electric bulb, while F is another metal piece acting as a hinge for B. In the larger drawing may be seen the



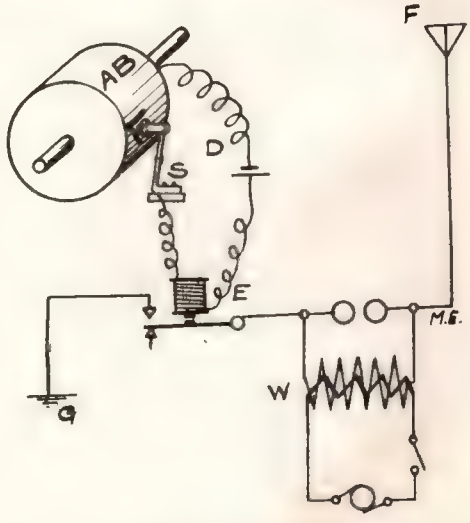
method of holding the dry cells, M and M^1.

The advantage of having a concealed electric lamp in a cane, is obvious, and the weight added is very slight.

SENDING DRAWINGS BY WIRELESS.

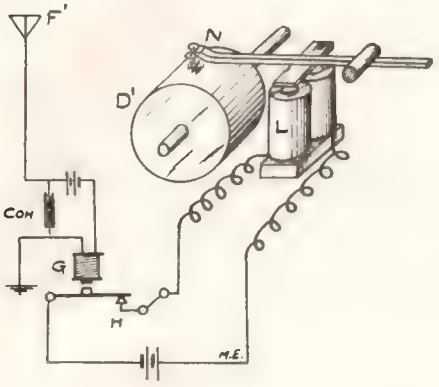
A new suggestion for sending drawings by wireless is as follows:

A drawing is made on the Cylinder, A B, with insulating ink. A B is made of metal, with a contact wheel pressing against it at S. The current from a battery is therefore intermittently broken by the insulating ink, and accordingly actuates the armature of the relay, E, which in turn



closes the circuit for the wireless transmitting outfit.

At the receiving end we find a coherer employed with a relay and decoherer. The contacts on the relay, however, have been reversed as will be noted in the diagram. D is a cylinder containing the paper, while L is a

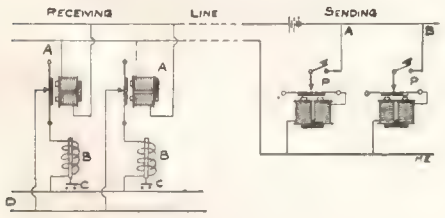


set of electro-magnets influencing N, which is a small wheel marking the paper with ink.

Probably if this idea was properly worked out, good results could be obtained, but as in many other instances, it probably will never exceed the embryo stage.

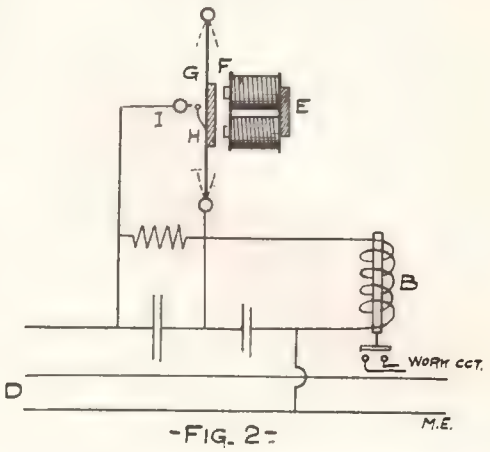
VIBRATORY CURRENTS FOR SELECTIVE CONTROL.

A method of producing vibratory currents of varying frequency, which may be applied to any selective control, such as steering torpedoes, ring bells, start motors, etc., is shown in the accompanying diagrams.



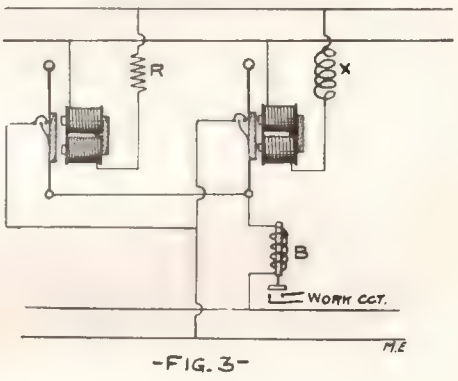
-FIG. 1-

The sending apparatus consists of vibrating plates, P, P^1, etc., which are tuned to a certain frequency. The receiving apparatus consists of a tuned plate, A, which vibrates to the frequency emitted by P, while A^1 operates on currents sent by P^1, etc. These plates in turn close the circuit, C, by means of a relay. Fig. 2 shows a full scheme for the connections in detail. In Fig. 3 a double vibrator is used.



-FIG. 2-

Each vibrator makes contact as shown, but such contacts are staggered by having one vibrator lag a ¼ phase,



-FIG. 3-

so the result is a continuity in contacts. The lag is produced by ohmic resistance at R, and a self-inductance which may be adjusted at X.

THE BROOKLYN WIRELESS CLUB.

The attention of the readers is called to the forming of a new wireless club, under the above name. The intention of the club is to bring the different members into closer relationship, and to reap the advantages of each other's experience and experiments. For full particulars concerning membership, write to Edward Joyce, Chief Operator, 460 Myrtle Avenue, or John Eckhardt, Chief Electrician, 53 Clifton Place, both in Brooklyn, N. Y.

World Radio History

MODERN ELECTRICS

A Magazine devoted entirely to the Electrical Arts.

H. GERNSBACK, Editor

A. C. LESCARBOURA, Assistant Editor

O. J. RIDENOUR, Business Manager

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Vol. IV. OCTOBER No. 7

EDITORIAL.

BEGINNING with the November issue our monthly page showing the various new patents for the month will be discontinued. Instead of giving only a single page of about twelve patents, we will print a number of pages in which we will bring a greater number of patents with good illustrations and a fair amount of text.

Every electrical invention of especial merit, patented during the month, will be described fully and we will furthermore try to discuss its merits and other points. This Department, which will be termed *"With the Inventor,"* will obviously be of great benefit to all interested in new inventions and patents. We shall strive hard to make this department one of the most important ones in *Modern Electrics,* as it covers a field of highest importance.

We will furthermore welcome letters from readers intending to patent articles and will give them our unbiased opinion whether we believe the idea to be good, whether we think it is patentable and whether we believe that if a patent is obtained it would be a money-maker or a failure. With the permission of the advice seeker we shall print his letter and our answer (of course omitting his name and details of the invention), for the benefit of our readers, as we desire to make the department an educational one.

We will also print questions and answers of correspondents and will give free general advice on patents, how to proceed, what to do and what not to do, in short, we will try hard to help the inventor in every possible manner.

We have pointed out in former editorials that eight out of ten U. S. patents are valueless. The inexperienced inventor as soon as he has an idea will rush blindly to the patent office, trying to obtain a patent at any cost. If he gets the patent it is rarely a good one, and seldom a money-maker.

We do not desire to discourage the inventor. Quite the contrary. We wish to help him and hope to save him money, time and disappointment. Our extensive experience with numerous patents is at the disposal of our readers and we believe to be qualified to give an honest as well as expert opinion on most electrical inventions.

Correspondence (envelope *as well as letter*) should be addressed to "Patent Department," care of *Modern Electrics.* Write only on one side of stationery. Sketches must always be on separate sheets, never in the text.

Ralph 124C 41 +

(Continued.)

By H. Gernsback.

SYNOPSIS OF PRECEDING INSTALLMENTS

Ralph 124C 41+, living in New York in the year 2660, while in conversation with a friend at his Telephot, an instrument enabling one to see at a distance, is cut off from his friend and by mistake is connected with a young lady in Switzerland, thus making her acquaintance by Telephot.

The weather engineers in Switzerland who control the weather decided to strike against the Government and turned on the high depression of their Meteoro-Towers, thereby snowing in a large district. An avalanche threatens to sweep away the house in which the young Swiss lady, Miss 212B 423, lives and she appeals to the great American inventor, Ralph 124C 41+, to save her, which he promptly does by melting the avalanche by directed wireless energy from his New York laboratory.

The inventor on the same afternoon is given an ovation by distance, in which the Telephot plays a great part. Afterwards he reads a "newspaper," the size of a postage stamp, and "writes" a lecture by means of the Menograph, an instrument by means of which words are made to appear on a paper tape by impulses from the brain acting on the apparatus. During the night his head is connected electrically to the Hypnobioscope, an instrument by means of which words and sentences are transmitted directly to the brain while one sleeps, in such a manner that everything can be remembered the next morning.

The great inventor, the next day, is visited by Mr. 212B 423 and his daughter from abroad. Both arrived by means of the Subatlantic Tube, piercing straight through the earth from New York to Brest in France. In the afternoon in presence of his guests and twenty professors from all over the globe, 124C 41+ brings life to a "radiumized" dog, who had been killed three years previous in presence of the twenty professors. The dog had been preserved with the rare gas Permagatol and Radium-K bromide, which latter occupied the blood vessels of the dog for three years.

124C 41+ then proceeds to show Miss 212B 423 wonderful New York. Both put on "Tele-Motor-Coasters," propelled by wireless energy and roll about the town. They then visit the new electric restaurant; the "Scientificafe," and enjoy a lunch of semi liquid food, supplied through tubes. Afterwards they see the monument of the last horse to die in harness in New York A. D. 2096.

Both then proceed in an aerocab to the National Playgrounds of New York City, located on Long Island where Montauk was formerly; they cover the distance in 10 minutes. They then play tennis and the charms of Miss 212B 423 keep 124c 41 spellbound. Finally when the young lady's wonderful long hair comes down by accident, 124C 41 takes a solemn oath that he can never be happy without her. Both afterwards visit the Hello-Dynamophore plant which is operated by the Sun's heat, transforming heat directly into electricity. This plant lights all New York and furnishes its power. In the evening 124C 41 entertains his guests in his Tele-Theater i.e. theater by distance. They hear and see the new play "La Normande," playing at the "National Opera" four miles distant from 124C 41's house.

THE entire party proceeded to roll down Broadway, the historic thoroughfare of New York. Despite the fact that it was 11 o'clock at night, the streets were almost as light as during the daytime. They were lighted up brilliantly by the Iridium spirals, hanging high above the street crossings. These light spirals emanated a pure, dazzling-white light of the same quality as sunlight. This light moreover was absolutely cold, as all electrical energy was transformed into light, none being lost in useless heat. There was no darkness in any street, not even in the smallest alley.

Mr. 212B 423, as well as his daughter, admired the superb displays in the various stores and they entered several to acquire some souvenirs. Miss 212B 423 was much impressed with the automatic-electric packing machines. The clerk making the sale would place the purchased articles on a metal platform. He then pushed several buttons on a small switchboard, which operated the "size" apparatus to obtain the dimensions of the package. Immediately after the last button was pressed, the platform would rise up about two feet, till it disappeared into a large metal, box-like contrivance. In about ten to fifteen seconds it would come down bearing on its surface a neat white box with a handle at the top, *all in one piece*. The box was not fastened with any strings or tape, but was folded in an ingenious manner so that it could not open of its own accord. Moreover, it was made of the extremely light metal Alohydrolium, which is the lightest of all metals, eight times lighter than aluminum.

The automatic packing machine would pack anything from a small package a few inches square up to a box two feet high by three feet long. The clever part, however, was that it made the box to suit the size of the final package, placed the articles together, packed them into the box which was not yet finished, then folded the box after the handle had been stamped out, stenciled the firm's name on two sides and delivered the box completely packed, all within ten to fifteen seconds.

The box could either be taken along or else the clerk would stencil the customer's name and address right into the handle, place a triangular packet-post stamp on the box and drop it into a chute beside the counter. The box would then chute down into the *Packet-*

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Post Conveyor, located from seventy-five to one hundred feet below the level of the street, where it would land on a belt-like arrangement moving at the rate of five miles an hour. The action was entirely automatic and the chute was arranged with an automatic shutter which would only open when there was no package immediately below on the moving belt. This precluded the possibility of packages tumbling on top of each other and thus blocking the conveyor-tube.

When the package had landed on the conveyor-belt it traveled to the nearest *distributor office,* where the post office clerk would take it from the belt and see if it was franked correctly. The stamp would then be cancelled automatically and after the clerk had noted the address he would route it to the sub-station nearest to the addressee's home. He then clamped onto the package an automatic metal "rider" which was of a certain height, irrespective of the size of the package.

The package with its rider was then placed on the express conveyor belt traveling at the rate of 25 miles an hour. This express belt, bearing our package, moved at a steady speed and never stopping, passed numerous sub-stations on the way. At the correct sub-station the rider of our package would come against a contact arrangement stretching across the belt at right angles, at a certain height. This contact arrangement would close the circuit of a powerful electro-magnet placed in the same line with the contact arrangement, a few feet away from the express belt. The electro-magnet would act immediately on the metal package, (Alohydrolium being a magnetic metal) drawing it in a flash into the sub-station from the belt. If there was another package right behind the one just delivered, it would be handled in the same manner. This system worked with absolute perfection and never failed.

After the package had arrived at the sub-station it would be despatched to its final destination. Another rider would be attached to it and the package would be placed on a local conveyor belt passing by the house of its destination. After arriving at the correct address its rider would strike the contact arrangement overhead, which operated the electro-magnet, pulling the package into the basement of the house, where it would fall on the platform of an electric dumb-waiter. The dumb-waiter would start upward automatically and the package would be delivered at once to the butler or other servant.

Thus a package would be delivered in the average space of forty minutes from the time of purchase. Some packages of course could be delivered in a much shorter time and others which had to travel to the city limits took of course much longer.

"How really wonderful!" Miss 212B 423 exclaimed after 124C 41 had explained the system, "it must have taken decades to build such a stupendous system."

"No, not quite," was the reply, "it was built gradually with an enormous number of workers building it. The tubes are even now extended almost daily to keep pace with the growth of the city."

124C 41 then took his guests up to the roof of an aerocab stand and they boarded a fast flyer.

"Take us about 10,000 feet up," 124C 41 said to the driver.

"You have not much time," was the driver's reply, "at 12 o'clock we have to be down again."

"How so?"

"Don't you know today is the 15th of September, the night of the aerial carnival? And you know it's against the law to go up over New York until it's all over. We have twenty-five minutes left, however, if you wish to go up."

"I clear forgot about this aerial carnival," 124C 41 replied, "but twenty-five minutes is time enough if you speed up your machine."

The aerial flyer rose quickly, almost silently. The objects below began to shrink and within three minutes the lights became slightly fainter.

In about ten minutes an altitude of about twelve thousand feet was reached, and as it became too cold, 124C 41 motioned to the driver not to rise further.

The spectacle which unfolded itself below his guests was indescribable. As far as the eye could see a broad expanse studded with lights, like a carpet embroidered with diamonds, was laid out. Thousands of aerial craft with their powerful search lights moved silently about and once in a while an immense transatlantic aerial liner would swish over the horizon with tremendous speed, the flare of its flashlights long in evidence after the disappearance of the liner.

The most beautiful as well as wonderful sight, however, were the *Signalizers.* In the first period of aerial navigation large electric lamps forming figures and letters were placed on housetops so that the aerial craft above would better find its destination. While a similar method is of course still in use, it goes without saying that for aerial vessels 5,000 feet or higher up in the air such signals are wholly inadequate, as they cannot be made out correctly at such a distance. Hence the signalizers. These are nothing but tremendously powerful searchlights of the most advanced type, mounted on certain buildings. These searchlights are trained skyward and thus shoot a powerful shaft of light directly upward. No aerial craft is allowed to cross such light shafts under penalty. Each light shaft gives a different signal; thus the signalizer in Herald Square is first white; in ten seconds it changes to red and in a further ten seconds it becomes yellow. Thus even an aerial liner out at sea can see the signal and steer right to the Herald Square pier, without being obliged to hover over the city in search of its pier. Some signalizers have only one color, flashing from time to time. Other more important ones use two searchlights at one time, like the one at Sandy Hook. This signalizer has two light shafts, one green and one red; these do not change colors, nor do they light periodically.

From high above our friends marvelled at these signalizers, which pierced the darkness all around them. It was an inspiring sight to watch the hundreds of light shafts, especially the ones changing colors, the weird beauty of it all thrilling sensitive Miss 212B 423 into ecstasy:

"Oh, if I could only watch this beautiful spectacle forever," she exclaimed, "it is so amazing, so superb! A fairyland could not demand more to satisfy its tenants." She stopped short as she noticed that the aerocab was descending rapidly and in a few minutes the strong light from below had obliterated the light shafts. As the craft drew closer the streets could be seen extending for miles like white ribbons and the brilliantly lighted squares stood out prominently. In a short while they landed, at the stroke of twelve. 124C 41 bade his guests sit down on the few unoccupied chairs and only then did they notice that hundreds of people were seated watching the sky expectantly.

At the last stroke of twelve, all the lights below went out and simultaneously with them the light shafts of all the searchlights. Everything was plunged in an utter darkness, an unusual experience for everyone, especially for a New Yorker.

Suddenly overhead at a great height the flag of the United States in immense proportions was seen. It was composed of about 6,000 aerial flyers all flying together in the same plane, with the same speed. Each one of course had very powerful lights on the bottom; some had white lights, other red ones, other blue ones. Thus an immense flag in its correct colors was formed and so exactly did the flyers work that, although they all were at least 50 feet apart from each other, the effect below was that of a real cloth flag, illuminated by a searchlight. Suddenly the immense flag began to move; it passed slowly overhead, describing a large circle, turning at the same time in its plane, so that the entire population below obtained a perfect view.

Everyone applauded and thousands shouted themselves hoarse at the inspiring sight. Then suddenly the flag disappeared as if destroyed and nothing could be seen in the darkness. 124C 41 explained to his guests that the lights of each one of the aerial flyers had been turned off in preparation of the next spectacle, and that there was no cause for apprehension.

Suddenly there was seen an enormous colored circle, composed of course of all the flyers. The circle revolved with great rapidity, becoming smaller and smaller, as though it were shrinking. Finally it became a colored disc revolving rapidly around its axis. After a few seconds, the edge opened and a straight line shot out—the disc unrolled like a tape measure. After a few minutes there remained nothing of the disc, it had resolved itself into a perfectly straight colored line, miles long. Then all the lights went out again. The next spectacle was a demonstration of the solar system. In the center a large sun was seen standing still. Next to the "sun" a red small round globe revolved quickly around it; this globe represented the planet Mercury. Around both the sun and "planet" Mercury re-

volved another globe, blue in color; this represented Venus. Then followed another globe, a white one, the "Earth." Close to the "Earth" another small globe revolving around the large globe was perceived. This represented the Earth's moon. Next came the red planet Mars with its two small moons, then green Jupiter and its moons, Saturn in yellow. Uranus in orange and lastly Neptune in pink, all globes and their moons traveling commonly in their orbits around the "sun." While the spectacle was in progress a white "comet" with a long tail traveled across the paths of the planets, turned a sharp corner around the "sun," its tail always pointing away from that body, recrossed the orbits of the "planets" again on the other side and lost itself soon in the darkness. Several more spectacles were then shown, one more superb than the one preceding it. The carnival closed with an excellent reproduction in colors of the portrait of the Planet Governor. This was greeted with unanimous applause and was exhibited for fully five minutes.

For a long time after the aerial carnival, 124C 41's guests exhausted themselves in various adjectives trying to express their undisguised admiration with wonderful, grandiose, incomparable, astounding, and so on.

"We have never witnessed such marvellous spectacles," Mr. 212B 423 remarked. "It takes you Americans to produce original ideas; upon my word, the old saying 'Nothing is impossible in America,' still holds good."

124C 41 and his guests then rolled home as it had become somewhat late. They went upstairs then and 124C 41 ordered his butler to serve a few refreshments in the *Bacillatorium*.

The Bacillatorium, invented in 2509 by the Swede 1A 299, is a small room, the walls and bottom of which are composed of lead. On the four sides of the room large vacuum bulbs are stationed on pedestals. These peculiar tubes a foot in height and about six inches thick and two feet in diameter are fitted out with a large concave Radio-arcturium cathode; the glass of the tube in front of the cathode has a double wall, the space of which is filled with helium gas.

The rays emanating from the cathode, when the tube is energised with high oscillatory currents, are called *Arcturium Rays* and have the great property to kill in a few seconds any bacteria and bacilli, no matter what kind. Arcturium Rays like X-Rays pass through solid objects, such as the human body, but when used alone produce bad burns on the human body. It was found, however, that by filtering arcturium rays through helium no burns on the human body would result, hence all arcturium-ray tubes have a helium filter in front of the cathode.

Now when the entire human body is exposed to such filtered arcturium rays, any germ or bacillus in or on the body will positively be killed off in a very few seconds.

The bacillatorium has been prescribed by law and each citizen is under obligation to use it at least every other day, and better each day. Thus it is impossible for the human body to develop contagious diseases, if it has been subjected regularly to arcturium rays. It has been estimated that even as late as in the twentieth century over 50 per cent. of all deaths were directly attributable to contagious and other diseases occasioned by germs or bacilli.

Thus since the introduction of the bacillatorium such diseases are unheard of and people now die only of old age, accidents or mind troubles. Infection is impossible. The arcturium-rays besides seem to have a highly beneficial effect on animal tissue and people subjected to the bacillatorium treatment now live from one hundred and twenty to one hundred and forty years, where in former centuries seventy years was the high average.

(To be continued.)

This novel started in the April, 1911, issue. Back issues mailed at 10c each.

EDISON IN BERLIN.

The European trip of Mr. Thomas A. Edison is soon to be terminated. At present he is at Berlin, with intentions to sail on board the *Amerika*, Sept. 27th, from Hamburg.

The great electrical industrial companies have arranged special inspection tours for the benefit of their American guest.

A GREEN WRAPPER

means your subscription expired. Better renew to-day and you won't miss important numbers.

New Electrical Appliances

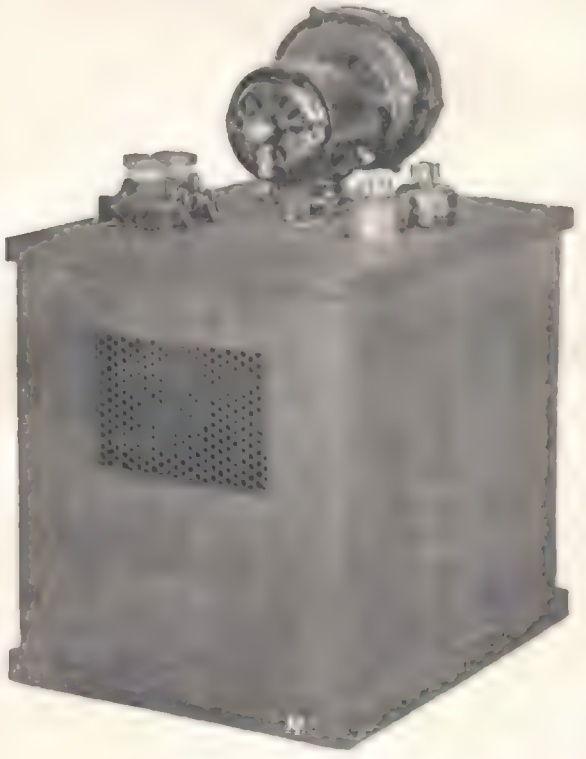
A NEW OZONATOR.

The ozonator is an apparatus for increasing the amount of ozone in the air by means of electrical discharges. Ozone is a form of oxygen, chemical symbol, O_3. It is a colorless gas with a sharp penetrating odor, resembling that of chlorine, in high dilutions, and that of moist phosphorus, in its more concentrated form. It is unstable under most conditions and readily decomposes into O_2 in the presence of oxidizable, or organic substances in general, the third atom forming a more stable compound with the substance attacked. This action renders it one of the most powerful oxidizing agents known.

In 1785 von Marum observed that the passage of an electric discharge through atmospheric oxygen produced a peculiar smell, which he referred to as the "smell of electricity." Later investigators also observed the smell under both similar and different conditions. In 1840, Schoenbein, among other experiments, demonstrated that ozone was produced by phosphorus in the presence of moist air. He invented the name ozone from the Greek root *ozo* (ppr. *ozon*) signifying smell.

While ozone may be produced in various ways the most efficient and economical is the electrical method. If a pointed conductor is raised to a very high electrical potential, the flow of electricity through the point produces a discharge called "electrical wind." The discharge is oscillatory, evidenced by the accompanying hissing sound, and in the dark is distinctly visible as a small whitish ball of fire at the point and a violet effluve extending from the ball. When occurring in atmospheric air the discharge gives rise to the characteristic smell of ozone.

The ideal method for the production of ozone, however, is to employ two plates or curved surfaces of large area between which the air to be ozonized is passed. When the intensity of the surface charge upon the plates reaches a certain value, the electricity leaks into the air between the plates, the energy thus absorbed by the air causing the molecules of oxygen to become ionized, thereby permitting the formation of molecules of ozone.



Ozonator.

The ozonator developed by the General Electric Company consists of an ozonizer proper and a transformer for changing the supply voltage to a value sufficiently high for the operation of the ozonizer units.

The transformer is located in the lower part of the case. The ozonizer rests on a horizontal wooden partition placed above the transformer. The ozonizer units consist of a number of glass tubes coated on the outside with copper. An aluminum tube is placed inside each glass tube, and separated therefrom by a small annular air gap. One of the high voltage leads from the transformer is connected to the copper coatings of the glass

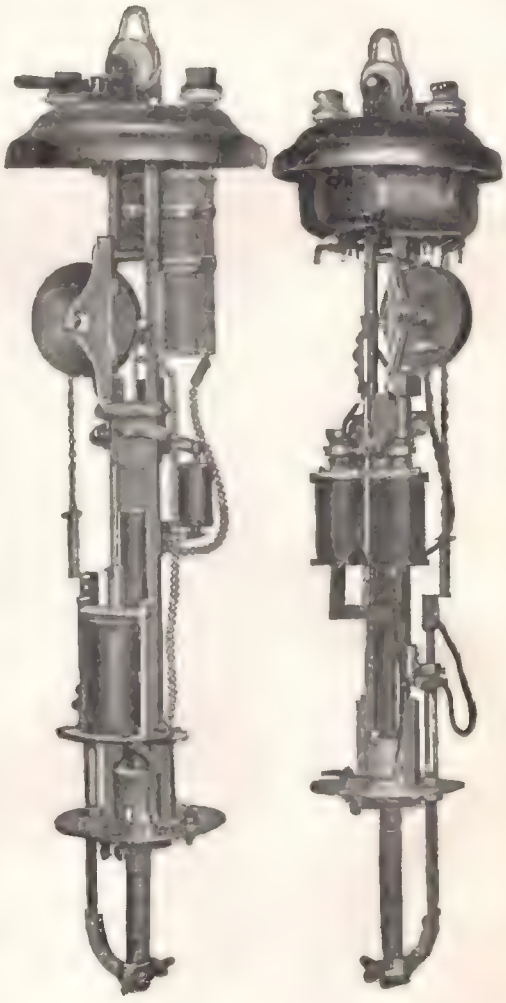
tubes, and the other to the inner aluminum tubes. When current is applied a violent electrical discharge takes place between the inner surface of each glass tube and the outer surface of its contained aluminum tube. This discharge changes the oxygen of the air in the annular air gap into ozone. The small but powerful centrifugal blower mounted on the top of the case blows air through the annular gaps of the ozonizer units, thence through the screen in the front of the case, into the room, thus insuring a flow of ozonized air into the room. One of the small switches located on top of the case is for putting the entire apparatus either in or out of service. The other is a three point switch in the transformer circuit. At the off point of the switch both the transformer and ozonizer are disconnected entirely from the supply circuit. At the first point only a comparatively low voltage is applied, thereby producing a small amount of ozone. At the second point the application of a higher voltage results in a correspondingly increased production of ozone. Thus the amount of ozone generated may be easily regulated according to the time of day, the moisture in the air, and other prevailing conditions.

NEW LONG LIFE FLAME ARC LAMPS.

THE new type "K" long life flame arc lamps now being placed on the market by the General Electric Company are available in four styles—K-28 for operation on series alternating current; K-51 on multiple alternating current; K151 on multiple direct current, and K-43 on power circuits, of all commercial voltages.

The mechanism is of the focusing type, automatically maintaining the arc in the same position, thus affording a constant and even distribution of light. A clutch of ingenious design permits the use of carbons varying considerably in diameter, and obviates all pick up troubles due to clutch wear, thus insuring a perfect feed. The chain wheel is made of alloy with separate grooves for the upper and lower carbon holder chains. As the upper chain unwinds the lower winds, thus keeping the arc always in the same position. The cores and coils are suspended by means of compression springs to prevent any flickering of the arc when the lamps are hung in places subject to vibration. Except in the series lamps no shunt spools are used, thus eliminating a prolific source of arc lamp complaints.

The lamps are provided with two globes. The inner globe may be of



Direct Current — Alternating Current

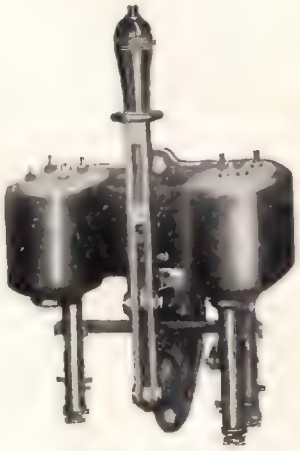
either clear or opalescent glass. Its open end is ground smooth and makes an air-tight joint with the machined surface on the under side of the condensing chamber against which it is held by a phosphor bronze spring. The outer globe is furnished in opalescent glass on the standard lamps, but may

be obtained in clear glass. The method of holding the outer globe greatly simplifies the operation of trimming. The complete globe holder is hinged to the condensing chamber, a retaining spring holding the outer globe in position uniformly and without pressure. To lower the outer globe for trimming it is only necessary to loosen the wing-nut provided and allow the globe to swing downward where it is out of the way. This arrangement obviates the necessity for removing the globe, thus preventing the liability of its swinging in the wind and breaking by striking against the pole. The lamps may be used without the outer globe.

To trim, it is only necessary to lower the outer globe, take off the inner, remove the stub of the upper carbon, press the new upper carbon firmly in the spring holder, insert the stub of the upper carbon cut off to the proper length in the lower holder, and replace the globes. The necessity for using only one new carbon at a trim greatly reduces the cost of maintenance, while the homogeneous structure of the carbons affords many advantages over the cored type. The size of the carbons—⅞ inch diameter, 14 inches long, gives great mechanical strength and decreases the breakage in handling.

The principle of ventilation applied allows the hot gases rising from the arc to circulate through the condensing chamber where they are cooled and the fumes condensed and deposited, thus keeping the inner globe clean and the illumination unimpaired. The casing is made of either copper or steel and is of the telescopic type to permit the ready examination of the entire lamp mechanism for adjustment or repairs without removing the condensing chamber or globes. The dome is a steel punching possessing great mechanical strength.

The arc voltage on the multiple alternating current lamp is regulated by a reactance, on the multiple direct current lamp by a resistance, and on the power circuit lamp by a resistance and a weight for properly balancing the arc voltages when two lamps are burning in series. In all the lamps the respective reactances or resistances are located within the lamp casing. The clutch rod from the top of the armature to the clutch lever, make the proper arc pick up being between ⅞ and 1⅛ inches.



Regulator Switch.

The series alternating-current lamp has an efficiency of .24 watts per mean hemispherical candle power, and the multiple alternating-current and multiple direct-current lamps have efficiencies of .28 and .41 watts, respectively. The series lamps have a life of 90 to 100 hours, the multiple lamps 100 to 120 hours, thus combining high efficiency with long life.

A MOISTURE-PROOF DRY BATTERY.

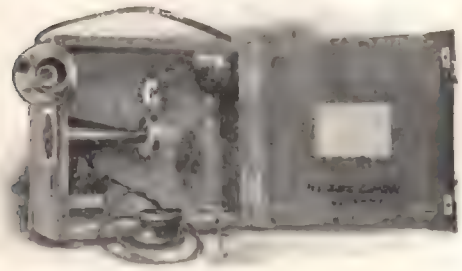
In damp places where ordinary dry cells are used, it frequently occurs that the cardboard cover will become very

moist, and conductive to the electric current. When many cells are placed together, it is obvious that there will be a loss of current, and a rapid deterioration in the cells.

The "Blue Bell" dry cell of the Western Electric Co., has been brought forward, which completely overcomes this difficulty. The cardboard cover is impregnated in a special moisture-proof compound. The cell in every other respect, is the same as the standard dry battery sold under the same trade name formerly.

A PORTABLE TELEPHONE SET.

Within recent years, telephonic communication is becoming prevalent in railroad work, and in many instances displacing telegraphic methods. For despatching it has been



found practical, and many railroads use it in preference to the telegraph.

A simple diagram of connections, has made it possible to use telephone instruments on the same line as is used for telegraphing, with neither of the two instruments conflicting. This discovery has made it possible for railroads to use both the means of communication without additional expense, inasmuch as the old wires are employed for both.

The Western Electric Co., have developed a complete line of special telephone instruments for this work, and among which is a clever portable outfit, which may be used between the regular stations.

The illustration allows a view of the inside of the set, the total apparatus consisting of a transmitter, receiver, a small buzzer, and a "howler" for signaling purposes. The "howler" is nothing more than a receiver which operates on the high frequency current of a buzzer sent along the line for signaling. By means of such a set, the train crew can cut in on the line and keep in touch with the train despatcher.

A PORTABLE ELECTROSCOPE.

A new indicator, for detecting the presence of high voltage currents (i. e., from 1,000 to 10,000 volts and over) has been invented. It consists of a

small electroscope enclosed in a suitable casing with a glass front. The metal sector moves in the electroscope when placed in the neighborhood of a line carrying a heavy voltage. By removing the ebonite handle on the instrument, and rubbing it on the clothing, the electroscope may be tested by touching the rod to the small ball on

the top of the case. For voltages up to 10,000, the ball may be touched on the wire, but for higher voltages, the ball must be brought to within a short distance of the wire only.

A NEW LIGHTING SYSTEM.

It is a well known fact that lower voltages produce the best results with electric lighting apparatus. It is possible to produce intense white light with low voltage electric lamps, and owing to the heavy construction of the filament, the lamps will last almost double the life of the 110 or 220 volt lamps.

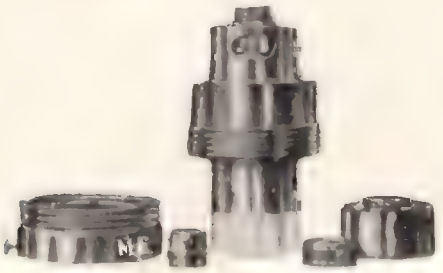


Fig. 1

In view of these facts, and many others, the Reduktor Elektrizitäts-Gesellschaft, of Frankfort, Germany, has introduced a complete line of small rheostats, and transformers. The rheostats are for use on direct current, while the transformers are to be used on alternating current lines. The current, anywhere from 110 to 500 volts is reduced to 14 volts on the secondary terminals. The transformers and rheostats are exceedingly compact, and fit into a socket which is slightly larger than those commonly used

Fig. 2.

Fig. 1 shows a transformer socket with the various extra parts. These special sockets may be wired directly on a fixture, furnished with 110 volts, and a 14 volt lamp used in the receptacle. The efficiency of these low voltage lamps is remarkable, and the current consumption is rarely over 0.9 watts per candle power.

Small battery motors, bells, toys, and other low voltage apparatus may be used on the current obtained from the reductor socket. Fig. 2 illustrates a transformer unit employed in a table lamp. There are many applications where these units will prove very satisfactory.

WANTED—A SAFETY LAMP.

The mine owners of Great Britain have given to the Secretary of State for the Home Department, $5,000 to be offered as a prize for the best safety electric lamp.

The judges are two distinguished electrical and mining experts. The competition is opened to all nationalities, and the winner will be tendered the prize. However, if close competition makes the electing of the winner difficult, the prize will be divided among several of the competitors. The lamps will be received at Rotherham not later than December 31st, 1911.

The more important requirements are that the lamps be of substantial construction to withstand rough usage, that no liquids be used if possible, and if such be employed, that it be secured against spilling, that any gas generated in the lamp have proper means of escape, that the lamp be locked so that tampering may be detected, and lastly, that the lamp be not less than 2 c.p. and capable of furnishing this light for at least 10 hours.

Upstarts seldom reach a high altitude.

If you would be popular, listen more and talk less.

The pretty widow and her insurance are soon remarried.

The trouble with the unexpected is that it happens too often.

What a man doesn't know about his neighbors his wife tells him.

New York by Night

Brooklyn Bridge and Lower New York.

WE reproduce herewith two night scenes of New York City.

The top photograph is of lower New York, with the Brooklyn Bridge plainly outlined. Towards one end of the bridge, the Singer Tower may be noticed. The World Building with its illuminated dome is also plainly noticed. The illumination is so powerful that the skeleton work of the new Municipal building is outlined plainly at the righ hand of the skyline. The various streaks of light in the foreground are caused by the lights on the steamers plying the East River.

The other photograph is a splendid example of the intensity of electric illumination. The Sherman Statue may be plainly seen, with the Plaza Hotel in the background, photographed at the Central Park entrance of 59th Street.

New York has gained the reputation of the most brilliantly lighted city by night. Visitors to the city are astounded by the many electrical signs and daylight effect of the important thoroughfares.

Sherman Statue and Plaza Hotel.
(*Courtesy New York Edison Co.*)

Hot-Wire Meter

By E. E. Ely.

We will endeavor to describe in this article a hot-wire ammeter, which, although easily made, is capable of very sensitive adjustment and accurate

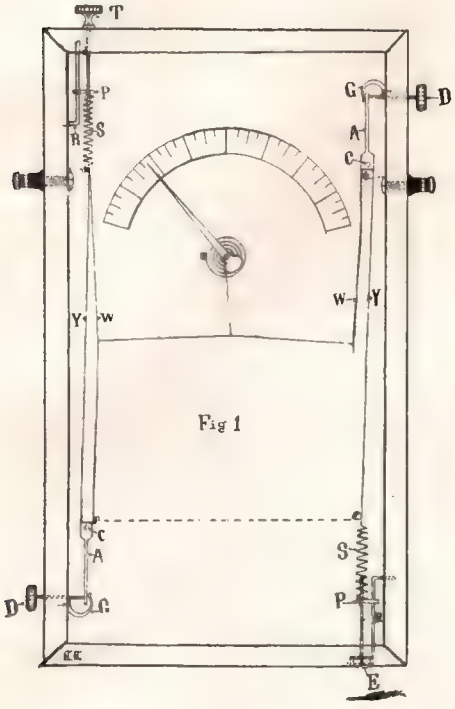


Fig 1

work. The size and general arrangements of the meter are optional with the builder, so no dimensions are given. The greater portion of the meter is similar to meters described in previous issues of this magazine, and needs no explanation. A new idea is, however, introduced in the arrangement and adjustment of the resistance wires, to compensate for changes of temperature. As will be seen, all adjustments can be made from the outside of the case in which the meter is contained, making it unnecessary to open the case for making adjustments.

The meter as described here has two expansion wires connected together by a thin silk thread, to which is connected another thread which moves the pointer. The latter is fastened to a balance wheel from a clock or watch, which, for best results, should turn in jewelled bearings.

Two resistance wires (W. & Y.), are of the same size and length, and used on each side. One of these (W.), carries the current, which is not allowed to pass through any part of the other, which for this reason must be insulated from the first. At one end these wires are fastened to the spring (S), the tension of which is regulated by means of the thumb-screw (T). This is screwed through a small plate, (P, Fig. 2), which has a hole in each end, one of which is tapped to receive the thumb-screw, while the other end slides on the rod (R). (See Fig. 3). To this plate the spring is fastened, and thus prevented from turning in being adjusted. This spring should be rather stiff, but not strong enough to break the resistance wires. The

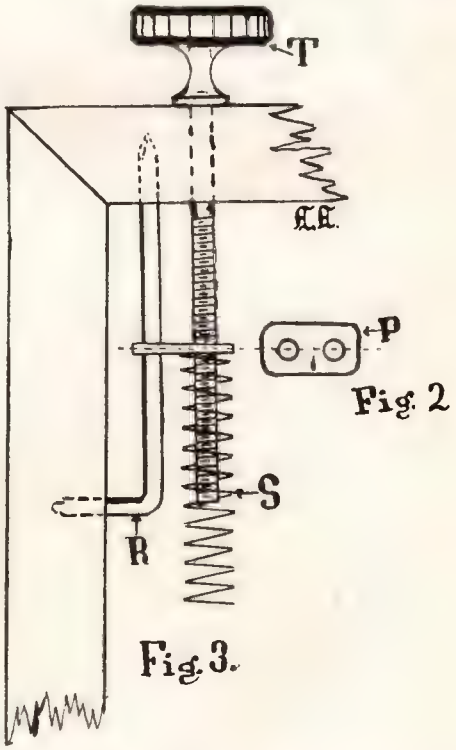


Fig. 2

Fig. 3.

other end wires are fastened to the end of piece (A), which turns upon a small screw (C). The other end of this piece forms a lever which is moved by the thumb-screw (D) and the spring (G). By turning this thumb-screw the length and tension of the wires is very accurately adjusted.

The action of the meter is as follows: Any rise of temperature will expand both wires, which are kept tight by the spring (S), and thus the pointer is not affected. However, if a current be passed through the meter, wire (W) expands from the heat generated by the passing current. The slack is then taken up by the spring of the balance wheel, thus moving the pointer over the scale. In this case, spring (S) is prevented from taking up the slack by wire (Y) which does not expand, as the current does not pass through it. The screw (E) may be provided with a slotted head and countersunk in the wood as shown, thus allowing the instrument to be stood on end, as it works with equal facility in either position. In the most delicate and sensitive meter, two of these pairs of wires are used, as shown in the accompanying figure. However, one pair will give good results, although it will not give so great a deflection of the pointer for a given current. The meter is provided with two binding posts, which are connected to the wires as shown by the dotted lines.

To adjust the meter, screw (D) is adjusted until the wires are at the same tension. Spring (S) is then tightened by the thumb-screw (T) until the pointer comes to zero.

RESISTANCE AND THE TELEPHONE RECEIVER.

By B. F. Dashiell.

The telephone receiver is a very important part of a wireless set. It is the most sensitive part next to the detector. It is very hard to obtain a good receiver, and a poor one will lower the efficiency of a good wireless set.

The resistance in ohms is the usual quotation of the telephone receiver.

It is not the resistance that makes a receiver sensitive, but the number of ampere turns, wound in a given space, around the permanent magnets.

One turn of wire carrying one ampere is called an ampere turn. One hundred turns, each turn carrying one-tenth ampere, is called ten ampere turns. Thus, in a receiver wound with one thousand feet of Number 40 wire, there is 1,000 ohms resistance, and as each turn carries the smallest fractional part of an ampere, it can be seen that thousands of turns are needed to produce even one ampere turn effect.

As telephone receivers deal with very minute currents, a large number of turns of very fine copper must be wound about the magnets, in order that the very weak current will influence the permanent magnetism of the magnets, which in turn influence the diaphragm of the receiver.

As the number of turns increases, the resistance also increases, thus weakening the previously weak current.

In the winding, a time is soon reached when too many turns are put on, and they do more harm than good, as they add resistance and do not influence the magnet. It can be seen that the resistance rapidly increases and the effect of the turns decreases.

A 500-ohm receiver may often have many more effective turns of wire than a 1,000-ohm receiver, thus proving that a high resistance telephone is not always the best.

If fine silver wire could be used for winding it would prove better than copper wire, owing to its better conductivity.

The diaphragm should be thin, just as thin as practical, and close to the magnet poles, but not touching them.

The magnets are an important part of the telephone receiver. Their magnetism should not be too strong, but must be capable of retaining their magnetism.

Many amateurs purchase telephone receivers because of their high resistance, but the writer thinks that these few lines will show plainly that resistance should not be considered when making purchases.

ATTENTION OF AMATEUR OPERATORS.

Amateurs residing in the Washington Heights section of New York City are requested to call regarding the organizing of a club in this locality.

E. A. SMITH,
455 West 140th Street.

A GREEN WRAPPER
means your subscription expired. Better renew to-day and you won't miss important numbers.

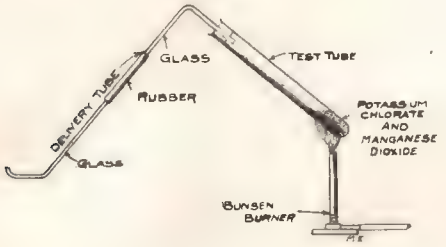
Simple Experiments in Chemistry

Philip Edelman.

OXYGEN.

While chemistry is an old science, it is still a very interesting subject. It is not dead by any manner of means. A large part of all the present manufactures depends upon its applications. It has become a practical subject, yet it is surprising how little attention has been paid to it in technical magazines.

The present articles have been prepared to fill a long felt want. They are intended to stimulate an interest in the subject. Directions for performing simple experiments with simple apparatus will be given. The apparatus will of necessity be simple, old bottles, pans, etc., being used. Experiments requiring expensive apparatus and materials have been omitted. Reactions and difficult problems have also been omitted.

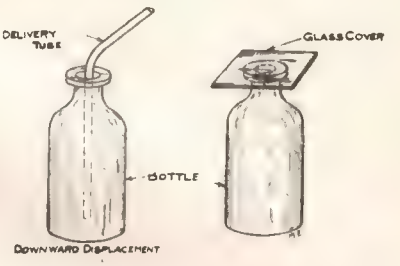


-FIG. 1-

Nearly all the materials used can be purchased in small quantities at any drug store. Rubber and glass tubing can usually be obtained there. Some special glassware and other apparatus may have to be obtained from some chemical house.

We shall start the experiments with oxygen. This element is one of the commonest gases. It forms one-fifth of the total volume of the atmosphere, and constitutes eight-ninths (by weight) of water. In combination with silicon and metals it forms nearly one-half of the earth's crust. It has no color, odor, or taste. It weighs a little more than air and is insoluble in water.

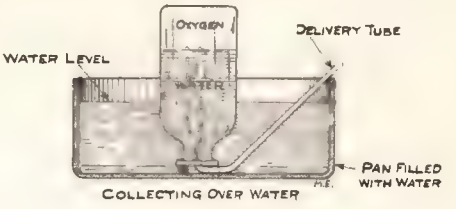
There are several ways in which oxygen may be prepared, but the generator shown in Fig. 1 is the most simple and therefore the best for our use. Mix a spoonful of potassium chlorate and a spoonful of manganese dioxide together and put the mixture into a test tube. Insert a rubber or cork



-FIG. 2- -FIG. 4-

stopper with a single hole, in the top of the test tube, having previously inserted the delivery tube in the cork. Glass tubing can very easily be bent into desired shapes if it is heated in a gas flame. For flexibility, short lengths of rubber tubing are inserted in the delivery tube between the glass tubing sections.

Heat the apparatus gently. Collect the gas in bottles for future use. You can collect the gas by downward displacement as shown in Fig. 2, or over water as in Fig. 3. This last method is the best, because you can tell when the bottle is full of oxygen. Collect five or six bottles full of the gas, stand the bottles upright and cover



-FIG. 3-

them with pieces of glass, as in Fig. 4.

Insert a glowing splinter of wood into a bottle of oxygen. It should burst into a flame. This is the test for oxygen.

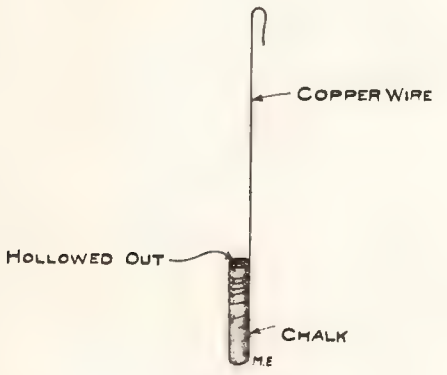
Heat a little piece of charcoal in a Bunsen burner flame and insert it in a bottle of oxygen. Cover the bottle quickly. The charcoal glows brightly

and throws off little showers of sparks. An invisible gas, carbon dioxide, is formed. Its presence can be proven by pouring a little lime water into the bottle, covering it quickly, and then shaking it. The lime water turns milky. The lime water is made by dissolving calcium hydroxide in cold water and filtering the solution. This solution should be put in a tightly corked bottle and saved.

Repeat the previous experiment, pouring in a little common water instead of the lime water. Test the solution with blue litmus paper. It turns red. Carbonic acid has formed.

In a like manner insert a little piece of burning sulphur in another bottle of oxygen. This is conveniently done by means of a deflagrating spoon. (See Fig. 5.) It burns with a vivid blue flame in the oxygen. A colorless gas, sulphur dioxide is formed. This can be told by its strong disagreeable odor. Pour water in the bottle and test with litmus paper. It turns red. Sulphurous acid has formed.

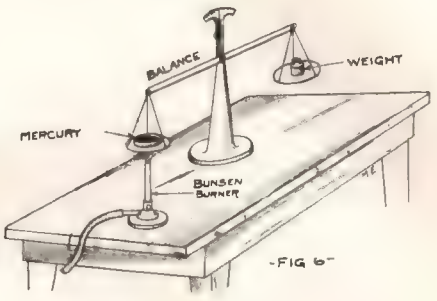
Roll a piece of iron picture wire in some moistened flour sulphur. Heat in a flame until the sulphur burns and



-FIG 5-

then insert in a bottle of oxygen. The iron burns with sparks. A little ball is sometimes formed on the end of the wire. Sometimes the inside of the bottle is coated with a red powder, a compound of iron and oxygen.

The foregoing experiments go to show the chemical activity of oxygen. You will notice that heat has to be applied in every case to start the action. Oxygen is active chemically only in the presence of heat. It is very mildly active to some materials at ordinary temperatures, however. When the charcoal burned in the oxygen it combined with it. The sulphur and iron did the same. This chemical conversion is called oxidation. Oxidation is not always fast enough to be accompanied by light and heat, but it nearly always produces a visible result. Iron and other metals rust, and wood decays, largely on account of oxidation. Sometimes this slow oxidation produces heat, as when oily rags, hay, and other materials often



-FIG 6-

suddenly take fire. This kind of oxidation is called spontaneous combustion.

Make a small balance as shown in Fig. 6, and put a little mercury on one side. Balance the scale delicately. Apply heat to the mercury with a Bunsen burner and watch that side of the scale go down. This may take some time. The mercury adds on oxygen from the air forming mercury oxide, and becoming heavier.

Oxygen is used commercially in medicine and in the oxy-hydrogen lamp. It is made commercially from the same materials which you used in your miniature generator, only on a larger scale. It is sold in heavy iron cylinders under pressure. Large quantities of it are used for calcium light apparatus in theaters.

(The next article will describe experiments with hydrogen).

If a man has an active mind he should train it to do a few practical stunts.

The Lord may help those who help themselves—providing they do not overdo it by trying to help themselves to more than their share.

AN EXPERIMENTAL ELECTRIC FURNACE.

(Continued from Page 414)

rivets, at each end and bend to a right angle in the center (see sketch I). Then cut your asbestos board (the heavy size) as follows:

4 pieces 10x9 inch. (side of furnace).
1 piece 10 x 10 inches (bottom).
1 piece 9¾x9¾ inches (cover).

Assemble as per sketch II, boring the holes in the asbestos board for the rivets. Have the rivet heads outside, use a washer inside, and hammer very carefully and not too tightly. This is the only hard piece of work connected with the furnace, but must be done very carefully, so as not to split the board.

When the box is assembled put a layer of asbestos wool on the bottom, which, when well stamped in, will be 3 inches thick. Set your tube upright on this, connect the leads to two binding posts on one side of the box, and tightly pack the asbestos wool all around until flush with the top of the tube. This should be about ¼ inch lower than the edge of the box. You can now withdraw the tube if necessary.

Drill a small hole near the edge of the cover, so that it can be lifted while hot with a metal hook, and drill another in the center to take a thermometer. Or you can drill a large hole in the center and cement or fasten mica over it, so that you can see what is going on.

Connect up as per diagram 3. On starting always increase the current gradually, giving, say 5-10 minutes between steps, so that the maximum temperature can be reached. This will mean a saving of current and longer life to your resistance wire.

When using at medium to high temperatures set the furnace on two bricks so as not to overheat the table top.

ROYAL WIRELESS OPERATOR.

It is not often that a European sovereign becomes personally a pioneer in the world of science, but the King of Belgium is making himself an authority on wireless telegraphy. A paper just read before the French Academy of Sciences announces that King Albert has had a complete radio-telegraphic system fitted up at his own expense at his palace at Laeken for the purpose of conducting experiments.

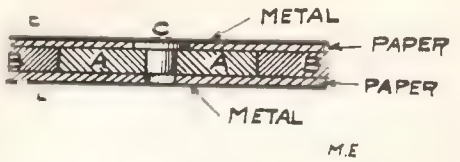
Among other investigations which his Majesty has made have been endeavors to locate the latitude of one town in relation to another, and in this the royal researcher has been completely successful. It was stated at the academy that his results were exact within one two-hundred-and-fiftieth of an inch, which seems near enough. The method employed seems extremely simple. All that is necessary is to send a wireless message, say from Brussels to Paris, and note the exact time of the transmission and receipt of the communication. As the passage of the Hertz waves is practically instantaneous the difference in time gives the difference in latitude.

It is hoped by King Albert that this method will be of the greatest service in producing accurate maps of the Congo; indeed, it was with this view that the apparatus was installed at Laeken.

A BURGLAR ALARM CONTACT CLOSER.

A contact maker for burglar alarm systems, which may be used under a carpet, may be made very simply, as shown in the diagram.

A A are soft rubber sheets, B B are hard blocks of insulating material, either fibre or wood, of the same thickness as A A. C is a metal push contact button, resting under the metal



plate, F, while there is another similar metal plate at the bottom. At E is a fine layer of paper, but not preventing C to make contact with the plates F F. When a heavy weight is pressed over C, it is pushed down and makes a contact with the lower plate, F, so that current passes through C, from F to F. A, being pliable, pushes the button out of contact after the pressure is removed.

A woman who says she feels like a queen usually acts like the deuce.

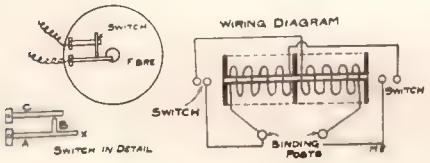
World Radio History

This department has been started with the idea to encourage the experimenter to bring out new ideas. Every reader is welcome to contribute to this department, and new ideas will be welcomed by the Editors. WHEN SENDING IN CONTRIBUTIONS IT IS NECESSARY THAT ONLY ONE SIDE OF THE SHEET IS USED. SKETCH MUST INVARIABLY BE ON A SEPARATE SHEET NOT IN THE TEXT. The description must be as short as possible. Good sketches are not required, as our art department will work out rough sketches submitted by contributors. IT IS THERFFORE NOT NECESSARY FOR CONTRIBUTORS TO SPEND MUCH TIME IN SKETCHING VARIOUS IDEAS. When sending contributions enclose return postage if manuscript is to be returned if not used. ALL CONTRIBUTIONS APPEARING IN THIS DEPARTMENT ARE PAID FOR ON PUBLICATION.

FIRST PRIZE TWO DOLLARS.

A DOUBLE ACTING SELONOID BELL.

Here is how I made a double acting selonoid bell that will almost awaken the dead. The size of the wire is immaterial, as the only difference would be in the number of dry or other cells used. I used No. 24 double cotton covered magnet wire, and four good dry cells will run it. This application of the selonoid principle has never been used in this way to my knowledge.



-FIG. 1.- -FIG 2.-

First, get a brass casing or pipe of about a quarter of an inch in diameter or smaller, and three inches long. On this and exactly in the center solder a one-inch brass washer. Then get some fiber and make two of the same size for the ends. This will give you a place for two coils on one core. The fiber washers should fit tight. Make the switch parts as shown at A and C in figure 1, out of spring brass or bronze. These should work very easily. Rivet them to the fiber washer as shown, allowing A to extend a short distance over the hole in the magnet. The arm, B, is to fit under the spring, C, but not touching it. Later you can adjust the switches so that they will work perfectly. As this switching mechanism is the most important part of the bell, great care should be exercised in making them. Now you are ready to wind the magnets. Look carefully at the diagram, figure 2. Wrap a layer of thin paper over each end or each part of the brass tube between the washers. This paper should be stuck fast. Start the winding as shown and wind one end of the spool full, leaving a short length extend near the center washer. You can then cover the wire with heavy paper and glue fast. In starting to wind the wire on the other end be sure to wind in the opposite direction from the one just completed. Finish same as the first. Be sure that you use an equal amount of wire on each one.

Now get a piece of wood, 4x10x1 inches for the base. Also two small pieces for the gongs to sit on. These will have to be made to suit the kind of gongs you use. Place one at each end of the base, so that the end of the magnet will be about one inch from the gongs. These gongs should be up free from the base and so that the edge is on a line with the center of the magnet. Make two clamps of brass to fit over the magnet and fasten same securely to the base. Secure a round piece of soft iron that will almost enter the hole in the magnet. Smooth this down thoroughly, so that it will slip from one end to the other without binding. Cut the iron rod to a length of 2½ inches. Then from a brass rod of the same size cut two pieces a half inch long and fasten them to the ends

of the iron rod. To do this cut a slot in the iron and also in the brass and put a small piece of sheet brass in the slot. Then solder fast. This must be made smooth. The brass tips are put on to keep the iron rod, which is the real magnet, from sticking to the gongs. Brass will not carry magnetism. Now put the iron rod in the magnet, mount your gongs, fasten the wires to binding posts and switches as shown at figure 2. Only one thing yet remains to do. On the end of A, figure 1, a portion of the switch extends over the hole. This you will have to bend so that when the end of the iron core sticks out near the gong that it will make contact with C, thus closing the circuit. This should not be stiff so as to hinder the core and the end should be insulated with paper so that the brass does not touch the iron. When current is turned on the core will be drawn toward one end until it hits the gong. But in doing this it closes the switch for the magnet at the other end, so that the core immediately starts toward the other end until checked by the gong. This is kept up as long as current is supplied.

Contributed by

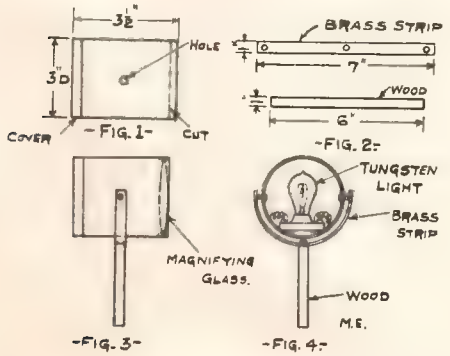
W. E. CHORPENNING.

SECOND PRIZE ONE DOLLAR.

A GOOD SEARCH-LIGHT.

A very good search-light can be made at a very small cost by following the given directions.

First procure a tin can with a cover free from rust, three inches in diameter and three and a half inches deep. Cut



-FIG. 1- -FIG. 2- -FIG. 3- -FIG. 4-

off the bottom as shown by the dotted lines in the sketch, Fig. 1. Next punch two holes in the middle directly across from each other, these are for the holder and are used later. Buy a magnifying glass three inches in diameter, cut the handle off and fit it in the end of the can. It can be soldered to the tin by the metal rim which surrounds the glass. Now get an 8 C. P. Tungsten lamp and mount it about one-half an inch from the end. Punch two holes in the bottom to lead the wires in.

A bright piece of aluminum three inches in diameter can be cut to fit on the back of the cover to act as a reflector. Next cut a brass strip 7x1 inches and a piece of wood 6x1x1 inches. Bore three holes in the brass as shown in Fig. 2. Bend it parallel with the outside of can and fasten with bolts to the holes in side. The piece of brass is screwed to the wood as shown in Fig. 4.

With four to five dry cells it will throw a light thirty-five to forty feet. It can be used with great success on a motor boat.

Contributed by

RAY YATES.

WIRELESS HINTS FOR THE AMATEUR.

1. Banana oil or turpentine is excellent for pasting tinfoil on transmitting condensers.

2. Black asphaltum is fine for painting wireless instruments on account of its insulating qualities.

3. Always have the lead-in wire from your aerial connected at its highest point and avoid leaving kinks and unnecessary turns in it.

4. Have transmitting instruments as close together as possible.

5. Avoid touching the detector with fingers as grease from same covers the surface and renders it useless for long distance receiving.

6. The slanting aerial is not as efficient as the parallel.

7. Don't use iron wire for an aerial, use copper or aluminium.

8. Use no smaller than No. 14 B. & S. gauge wire for the antenna.

9. Use high tension cable for wiring sending instruments.

10. To find approximate wave length of aerial multiply height of aerial in meters by four.

Contributed by

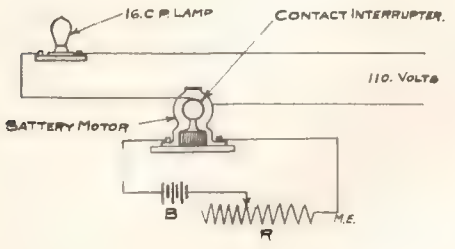
EDWARD WERNER.

World Radio History

A POWERFUL SEARCHLIGHT.

Having read in a previous issue of *Modern Electrics,* of a new idea in France for obtaining high candle power with an overloaded lamp, I decided to experiment along these lines, and have succeeded with good results.

I used a carbon filament lamp, of



16 c.p. and with a rating of 65 volts. This was connected in series to 110 volts with a small motor break in the circuit. This break consists of a small battery motor, operated by three dry cells, with a rheostat in the circuit. On the shaft is a fibre wheel containing a piece of brass strip upon which presses a copper brush, all as shown in the diagram.

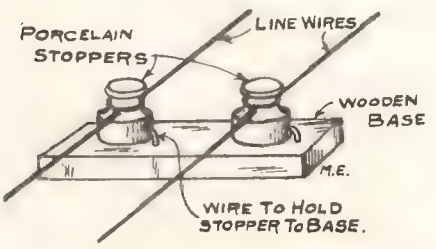
The light is exceedingly powerful, and approaches very nearly the intensity of an arc lamp. In fact, light may be thrown 300 feet without difficulty on a dark night. When used in the automobile lamp which I dismounted from the car, the results were greatly multiplied. The lamp is slightly black, but probably will last many more hours. When the lamp is used directly on 110 volts it will last only about one hour and a half.

Contributed by

GEORGE PARSONS.

A CHEAP INSULATOR.

A good little insulator, suitable for



small telegraph and telephone lines can easily and cheaply be made by taking the porcelain stopper, generally used on beer bottles, and, after removing the heavy wire and rubber, attach it to a wooden base as in diagram.

Contributed by

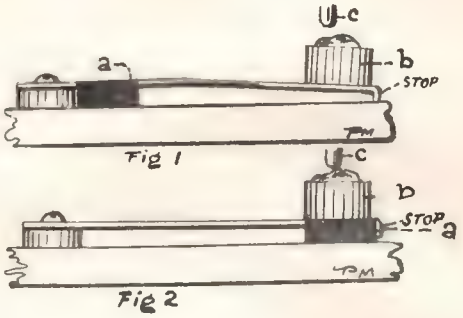
FRANK GREENFIELD.

SIMPLE CONTACT OPENER FOR CRYSTAL DETECTORS.

It is well known to wireless experimenters that the spark of the sending set decreases the sensitiveness of the detector, if it is of the crystal type, and if the point of contact with the mineral is not open.

A simple device that efficiently prevents this action is shown in the illustration.

When the slider, *a,* is at the extreme left (Fig. 1), the cup, *b,* containing the mineral drops down and the crystal



does not make contact with *c;* then transmitting may be carried on without harm to the detector.

When, however, the slider is pushed to the right (Fig. 2), the contact between the mineral in the cup, *b,* and the point, *c,* is restored, and receiving may be carried on.

Contributed by

P. MERTZ.

A DRY CELL.

By following the directions given below, one can easily make a battery which is absolutely dry, that is, one into whose construction no liquid enters. Take a zinc plate, and a copper plate, both of the same size. On one of the plates pour a quantity of melted hyposulphite of soda, place the other plate on top, and allow to cool. After it has cooled thoroughly, attach binding posts, and you will have a battery which is dry, and gives a

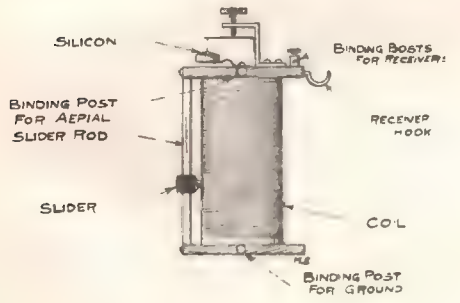
fairly large current, depending on the size of the plates, and the thickness of the soda between the plates. This battery costs very little to make, the soda costing about 10 cents a pound at any drug store, and gives a current sufficient for use with a wireless detector.

In making wireless instruments, I often desired a good method of plating the brass parts, and have tried many ways, until I hit upon the following, which I have used with great satisfaction ever since. I used a dime as one electrode, and the object to be plated as the other, in a dilute solution of sulphuric acid. After the part I was plating turned black, I took it out, and wiped it off with a rag, after which, I replaced it in the solution, and repeated the operation until the object was sufficiently well plated. Almost any metal may be used instead of the dime to plate with.

Contributed by
HARRY E. MUENCH.

A COMPACT WIRELESS SET.

The accompanying diagram shows how I combined a universal detector and a tuning coil into one instrument. It proves very satisfactory and useful where only a small space is available.



The diagram is self-explanatory, and connections can be made as desired. The set has four binding posts, one for the aerial, one for ground, and two for receivers.

Contributed by
WALTER NEUMAN.

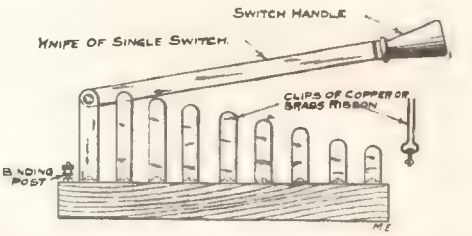
A GOOD LACQUER.

I have found the following formula a very good lacquer for brass. Dissolve in water as much alum as it will hold in solution. Then add an equal amount of hydrochloric acid. Into this put the brass to be lacquered and allow to remain for ten minutes, after which put it in cold water.

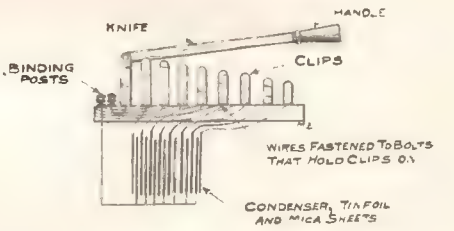
Contributed by
MAURICE RUBIN.

SIMPLE VARIABLE CONDENSER

Here is a diagram of a very simple variable condenser for receiving, from which I had very good results. The



clips are made from ribbon brass or copper. The knife blade is from a



single pole switch. The case is made of oak or pine and varnished to suit. Condenser is made of tinfoil and thin sheets of mica, 2x3 inches. After the condenser is in the case paraffine is poured in around it. The rest is self-explanatory.

Contributed by
PHILIP E. THULANDER.

CHEMICAL PLANTS.

I once had occasion to perform the following chemical experiment, and as the results were so pleasing I thought perhaps some readers of *Modern Elcctrics* might like to repeat it in their own laboratories.

We will call it, for want of a better name, the production of "Chemical Plants," the only articles necessary for success are, a test tube or glass tumbler, some silicate of soda and some

metallic salts, such as sulphate of nickel, iron, copper, etc. Now fill the test tube about one-third to one-half with the silicate of soda then add pure water to within an inch or so of the top, drop some of the metallic salts into the solution and very soon (when nickel or iron salts are used, the copper is not so rapid), it will be seen that sprouts will appear and grow with great rapidity in fantastic shapes. If chloride of cobalt be used in place of, or together with the nickel or iron, very beautiful color effects will be observed.

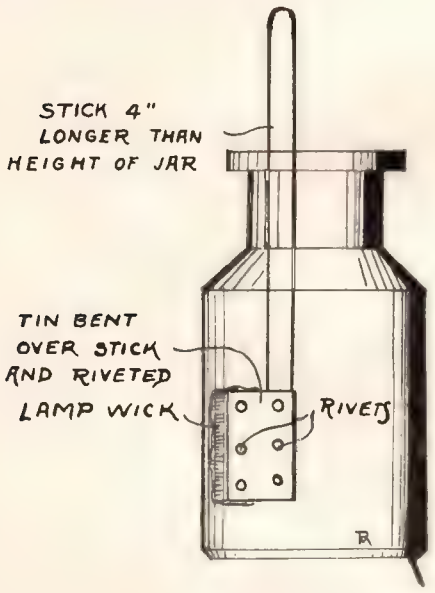
This experiment is so simple to perform and so beautiful in its results that it would be well worth one's time to try it.

Contributed by

C. W. SCHWARTZ.

COATING THE INSIDE OF LEYDEN JARS.

A good way to coat the inside of Leyden jars is to cover them with a



thin coat of shellac and then fill the jar with bronze or copper dust. When the shellac is dry pour out the excess of dust.

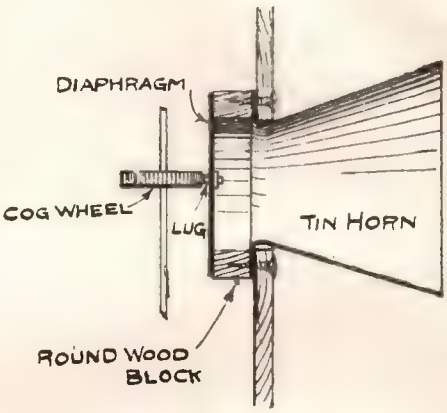
This method absolutely prevents wrinkles, which are so hard to keep away when the inside is coated with tinfoil.

Contributed by

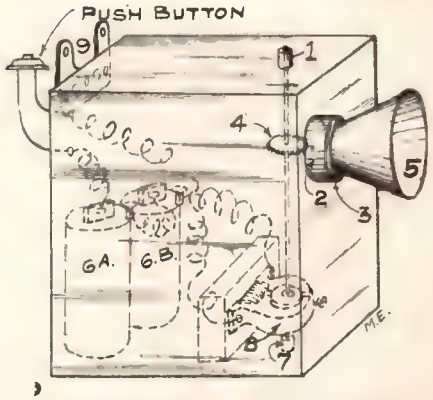
P. MERTZ.

AN ELECTRIC HORN.

Herewith is a description of an electric horn which I will not classify as an auto horn on account of its rather monstrous dimensions. However, it serves admirably for signals in noisy factories and displaces the time-hon-



ored farm bell. The drive shaft is a ⅜ iron rod running through the armature of the motor. The bearings are ¼ in. brass tubing, with ⅜ in. bore. The diaphragm is a round piece of steel with an iron lug riveted in the center, the lug, of course, facing inwards. The block for the diaphragm is oak, 2½ inch outside diameter, 1 inch wide, 2 inches inside diameter, the diaphragm being tacked to the



1- BEARING, UPPER
2- DIAPHRAGM
3- BLOCK
4- COG WHEEL
5- TIN FUNNEL
6- A & B, BATTERIES.
7- BEARING, LOWER.
8- MOTOR.
9- BRACKET.

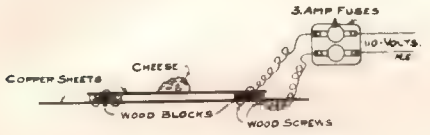
block and the block in turn secured to the case with 4 screws. The cog

in the machine I examined came off a Dayton cream separator, but any steel cog with fine teeth will do. It is soldered or better brazed on the shaft. For a horn, a tin funnel will serve admirably by cutting off the neck and using the cone. The case is given four coats of spar varnish and one side is hinged so as to be able to change the batteries. The motor can be any small battery motor or a fan motor rewound to run on 2 or 3 cells, can be used. The brackets are cut from ⅛-inch iron as shown. The motor is fastened on an upright as shown, which must be fastened securely or the horn won't give a good tone. With two dry cells the horn screams, with four it roars. Don't forget to insert a push button in the circuit.

Contributed by
EDWARD HUTCHINSON.

AN ELECTRICAL RAT TRAP.

An electrically operated rat or mouse trap, may be very readily constructed, and at slight expense, providing the experimenter has the use of lighting current in his home.

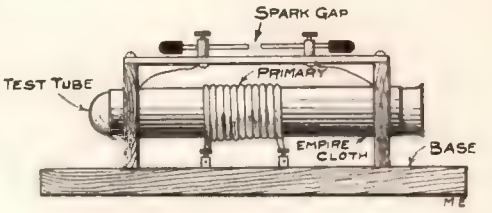


A sheet of thin copper about one foot square is used for the bottom part. On this, another copper sheet six inches square is laid on top, but with blocks of wood between, to insulate the two copper sheets. Small short screws may be driven through the copper sheets, but great care must be taken to see that the screws do not pierce all the way through the wood and thus short-circuit the two sheets. Two wires from the 110-volt supply, are now connected to each sheet, and a piece of good, strong cheese, which has been burned just a few seconds over a flame, is placed in the middle of the top sheet. The rat on trying to get the cheese, touches both contacts, and is electrocuted.

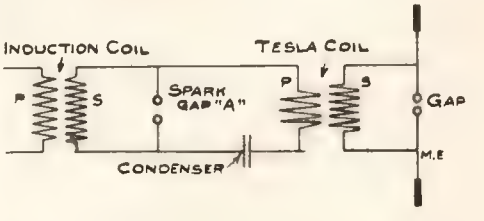
Contributed by
CHAS. SCHWITZER.

A MINIATURE TESLA COIL.

Most owners of small induction coils have at some time or other wished that a Tesla coil giving results could be built to run on their apparatus. This article describes a Tesla coil made to work with a one-quarter inch spark coil.



Make a base 8x3x½ inches, and two uprights two inches square and one-quarter inch thick. Now get a test tube 5¾ inches long, inside diameter three-quarters inch. A cardboard tube of the same dimensions will do. Through each of the uprights drill a hole large enough to let the test tube slip through. Starting one-half inch from the end of the tube, wind on about 135 turns of No. 31 single silk copper wire, spacing the turns 1/32 of an inch apart. About one-half inch from the other end of the tube stop winding. Shellac the wire and your secondary is finished. Now put on a strip of Empire cloth 5½ inches wide, winding on three layers. At this stage the uprights may be slipped onto the test tube and secured to the base 4¼ inches apart. The holes in the uprights must, of course, be large enough to let the test tube, with the wire and cloth, through. The



primary, consisting of eleven turns of No. 18 rubber covered copper wire, is now wound over the Empire cloth; 20 turns of No. 20 double cotton covered wire will do as well. Nail a strip of wood on top of the uprights, and by means of two binding posts

fastened to it, make a spark gap. Connect the secondary wires to these posts; the primary wires terminate in binding posts fastened to the base.

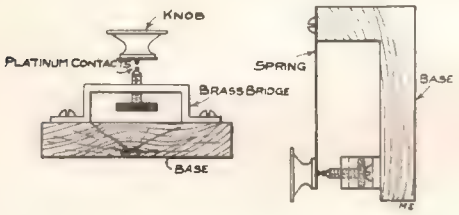
The above coil, run in conjunction with a one-quarter inch spark coil operated by three dry cells, and a single small Leyden jar, gave a spark nearly one-half of an inch long. The brush discharge at the spark rods in the dark, is about one and one-half inches long when no spark is passing. The spark varies in color and thickness with the materials used in the spark gap. When allowed to jump to the hands it produces no sensation whatever. Use pointed zinc or brass rods in spark gap A in the diagram.

Contributed by

CARL DREHER.

A NOVEL KEY.

Enclosed find sketch of telegraph key that was made out of a spark coil vibrator. As all vibrators have large



platinum contact points, this key can be used to break heavy currents.

Contributed by

JOE SIMON.

CHANGING DRY CELLS TO WET CELLS.

Take a clean glass jar and stand in it one old dry cell. Around this place one-half pound of blue vitriol and then pour enough water to come at least half way up the dry battery. In an hour the cell will be ready to use again and will give good service.

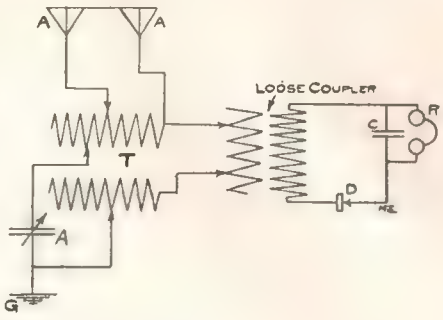
Contributed by

DON MEAD.

(Oh you Don! Why not use apple sauce instead of Blue Vitriol?—"FIPS.")

A NEW HOOK-UP.

A short time ago I hit upon this hook-up which I have never seen in print. It is certainly excellent for tuning. A loop aerial is used. T is a small set of close coupled double tuners. The variable condenser may be



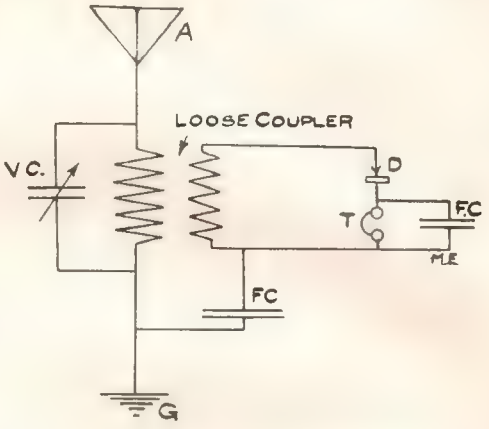
omitted if desired.

Contributed by

FRANK TAYLOR.

A RANGE INCREASER.

I found that on listening in on some stations if a condenser (C^1) of four



hundred square inches tinfoil is switched in as shown, a decided improvement is noticed.

Contributed by

JOSEPH E. FRISBEE.

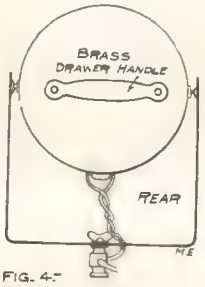
A MARINE SEARCHLIGHT.

In an effort to fill the need of an efficient but low-priced searchlight for the motorboat, the writer has designed this model. Parts required: One concave shaving mirror, 5 inches in diameter; 1 hard brass strip, 1 inch wide by 18 inches long; 1 large brass binding post, one brass drawer handle, 5 strips of window glass, 1x5 inches; 1 miniature porcelain socket or base; 1 miniature base tungsten lamp, 1 sec-

tion of green silk covered double conductor lamp cord, one metal cylinder, one end closed, 5 inches diameter by 7 inches deep.

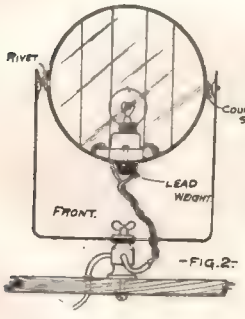
This last item may well be substituted by a new tin coffee can, the inside of which should be polished with machine oil, which also prevents tarnishing and rusting. First punch two holes in the bottom of this cylinder, as far apart as the holes in the brass handle. Remove the back of the concave mirror (the ten cent variety will do

-FIG. 1.-

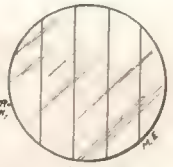


-FIG. 4.-

for this item) and punch two hol s in it, also the same distance apart as the handle holes. Insert two short flathead machine screws, with heads towards the mirror, and replace the back again. Now insert the mirror in the cylinder, face up, and pass the two



-FIG.2.-



-FIG.-3.-

screws through the holes in the bottom of it, after which place the brass handle over the screws and put on the nuts, Fig. 4.

Next cut the ends of the brass strip round, bore or punch a hole ½ inch from each end, and one in the exact center. Six inches from each end, bend the ends up, (not a sharp cornered bend, but round as shown in Figs. 2,-4). Now wire the socket and punch 4 holes in the side of the cylinder that is to be turned down, Fig. 1 (preferably the seam side). These 4 holes should be about half way from each end of the cylinder. Insert the socket and screw in the lamp. Pass the two wires through 2 of the holes, and fasten the socket by means of machine screws passed through the other two, and put the nuts on tight. Having cut the glass strips to make a five inch diameter circle, as shown in Fig. 3, cut a slit parallel and near to the seam at the open end, one inch long. This will allow the glass strips to be inserted in the pressed-out collar of the can, after which temporarily bind it tight again with wire while it is soldered, then remove this wire. Solder two rivets to the sides of the cylinder as shown in Figs. 2,-4, and solder two brass counter-sinks to the inside of the ends of the brass strip, over the holes. Solder a small lead weight in the center of the under side of the cylinder. This will keep it level when not guided by the hand. Substitute a short, winged, machine screw for the thumb-screw on top of the binding post, and pass it through a washer, the brass strip, another washer and screw it in the top of the binding post as shown in Fig. 2. This serves to clamp the searchlight in any position in a horizontal plane, while by means of the brass handle, it may be pointed up or down or swung around. Pass the cord through the unthreaded hole in the binding post, and be sure the winged screw is short enough not to pinch it. Fasten the whole down where it is to stay by means of the bottom screw of the binding post, (Fig. 2). Paint the cylinder an ivory black, and polish all the brass parts, and you will have as attractive and serviceable a searchlight as any small craft carries. This light may be run by the magneto or the storage battery, and on account of the small tungsten lamp, will not cost nearly as much to operate as the gas lamps used on many craft.

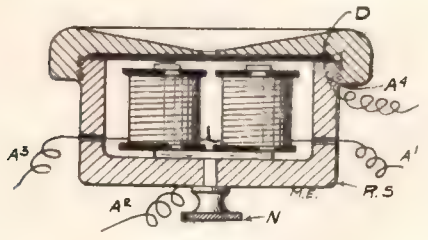
Contributed by

E. JAY QUINBY.

A SENSITIVE RELAY.

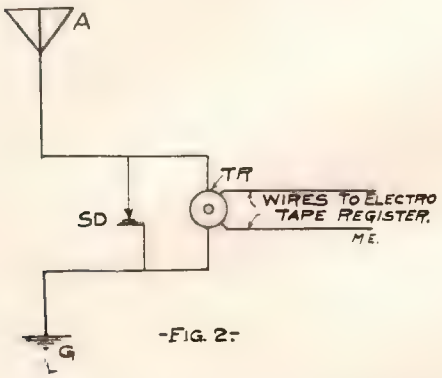
Here is a diagram for a relay which I have used to some extent. It is made of a telephone receiver.

A hole is bored through the shell at A^4 and a wire passed through and



-FIG. 1-

soldered to the diaphragm, D, and another is fastened under the screw, N. This relay may be made with any resistance the phone may have. It can also be connected to any detector. The



-FIG. 2-

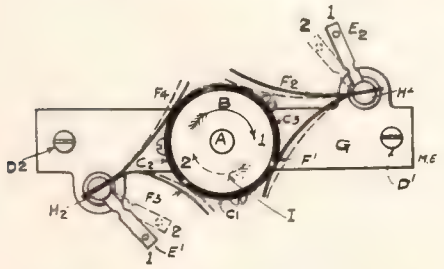
two wires, A^1 and A^3, are connected to the detector as an ordinary receiver and other wires, A^2 and A^4, are connected to a tape register in series with a battery.

Contributed by C. J. SEDLAK.

(Pretty, isn't it? Why not patent it, C. J.?—"FIPS.")

A SIMPLE MOTOR REVERSER.

Following is a description of a simple reverser which I have worked suc-



cessfully on an Ajax and Porter No. 1 motors and which can be worked on all motors having similar brush holders.

The construction may be seen in the drawing. G is the bearing, A is the shaft, while B is the insulation. By putting two brushes in the holders and bending them the way shown at F_1, F_2, F_3, F_4 so that F_1 and F_4 bear on the segments C_1, C_2, C_3 at the same time the motor will run in the direction of arrow No. 1, but if the handles E_1, E_2 are moved from position No. 1 to position No. 2, as indicated by the dotted lines, it will be found that the motor will run in direction of arrow No. 2. D_1 and D_2 are equal to the bearing screws while L equals the commutator. It is not necessary to change any wiring.

Contributed by R. W. CARNAHAN.

WIRELESS ASSOCIATION OF MADISONVILLE, O.

The Wireless Association of Madisonville, O., was organized on August 25, 1911. The following officers were elected:

John G. Mackie, president; G. Howard Loeb, vice-president; Asbury Shumard, secretary, and Raymond Wilson, treasurer. The purpose of the association is to advance the art of wireless telegraphy, and to bring the brother amateurs within a 25 mile radius, in closer relationship.

The qualifications for membership are that the applicant live within 25 miles of the town, and be over 13 years of age. Address correspondence to Mr. Asbury Shumard, 5609 Tompkins avenue, or Mr. John G. Mackie, 4717 Stewart avenue, both of Madisonville, O.

When a young widow meets a man after her own heart she begins to sit up and take notice.

A woman may be a perfect lady while gnawing corn off a cob, but she certainly doesn't look it.

During the engagement she hopes to make him a good wife; after marriage she hopes he will make her a good husband.

Copies of April and May, 1909, of MODERN ELECTRICS, will be paid for at the rate of ten cents each if returned to us prepaid.

Aeronautic Department

Edited by AUSTIN C. LESCARBOURA

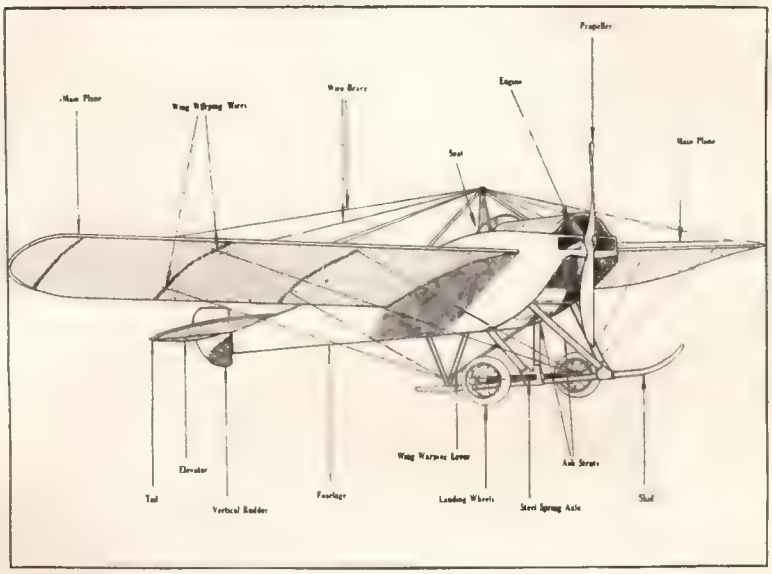
We greatly dislike to invade a new field, and more so if it is entirely foreign to the title of our publication.

In the past few months, we have noticed a rising tendency among our many readers to become interested in aeronautical literature. This is not surprising, for with the many events of unusual interest occuring almost daily, the aviation craze is fast becoming as popular here as abroad. We therefore after due deliberation, have decided to introduce a department devoted to aviation, as a regular monthly feature, allowing as many pages as the interest which it creates, permits.

Articles and photographs on the subject are invited and solicited. They will be paid for at our regular terms. We especially invite articles describing the construction of aeroplanes, gliders, or models, with suitable sketches, or photographs.

Sincerely anticipating that this department will meet with the usual cordial interest granted by our readers in the past, we present the first instalment.

The Nieuport Monoplane



The laurels for speed held by the Bleriot monoplane for a score of months, have finally been wrested away by its speedier rival, the Nieuport monoplane.

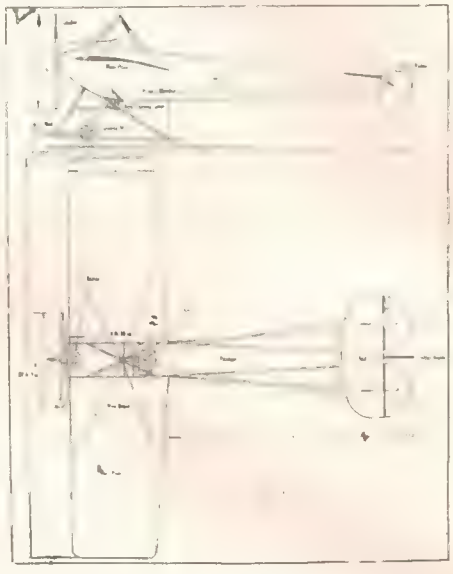
The Nieuport monoplane, is the result of years spent by the inventor in costly experiments. It is original in many details, and in fact does not resemble any prototypes, being a unique departure from the generally accepted standard types. Aside from its records exhibiting its peerless speed qualities, it is the proud holder of the Gordon Bennett International Aviation cup, won by the American aviator, Mr. Charles Terres Weymann, at Eastchurch, England, recently.

Unlike most other aeroplanes, the Nieuport is made entirely at one factory, and by one concern. The engine, magneto, tanks, fittings, and even to the spark plugs, we find originality, and that the individual parts are made in the aeroplane factory. However, owing to the tremendous speeds required to compete in the more important events, the larger racing Nieuports, are equipped with 50, 70, or 100 h.p. Gnome rotary engines. The smaller Nieuports, for regular exhibition purposes, are equipped with

the Nieuport 25-30 h.p. opposed cylinder motor.

The speed qualities of this type are remarkable. The designer has always predicted that greater speed would be obtained by proper design rather than by abnormal and exaggerated power plants. That his prediction is partly accomplished, may well be acknowledged by the records he has established in a 25 h.p. Nieuport. In March, 1911, M. Nieuport was able to pilot his monoplane equipped with but the 25 h.p. engine at a terrific pace of 66.5 miles per hour around a closed circuit. This is the first aeroplane to have flown successfully at a speed in excess of 60 miles an hour and with but 25 h.p. Compared to the "Baby" Wright biplane which uses a 60 h.p. engine, and rarely has developed greater speeds than 55 miles per hour, we can note that the Nieuport is built with greater efficiency in design.

While the greatest quality of the Nieuport monoplane is in its superior speed, yet it has many others, which are none the less worth observing. The construction, which makes possible the great speeds with little power, has been a revelation to the aeronautical world. Most of the aeroplanes have a maze of guy wires, to reinforce each portion of the structure, while in the Nieuport, the absence of stay wires is instantly noticed. There are probably not over one dozen stay wires in all, and these are used for supporting the main planes to the body. The fuselage is entirely covered with canvas, and not like the original Bleriot monoplanes, which had the main frame work entirely opened. However, the Bleriot construction has been following Nieuport ideas, for in their latest types, the framework is likewise closed. The wings, perhaps the most important part of any aeroplane, are made for the greatest part, of small steel girders. This oblivates much of the stay wires which would be necessary, were wood employed. The wings have a peculiar pitch, and in fact allow greater lifting power and higher speed with less power than any other design thus far used. Then again, a point not to be overlooked, the safety of the aviator in crashes, has been incorporated in the structure features. The aviator is encased in the center portion of the framework between the wings, so that the framework and planes have to be completely demolished before the aviator is injured. The engine has been placed well to the front, and encased also in the framework, preventing its weight from crushing the aviator in accidents.



For cross-country flying, the machine is well adapted, for it is provided with an extra strong chassis, which is again unique in its originality over other types employed by rival builders.

The drawings accompanying this article, give dimensions for the racing type equipped with the 50 h.p. Gnome engine. We are indebted to the "Automobile Journal", for these drawings, which give complete details of the aeroplane.

DEATH OF MONS. NIEUPORT.

As we are going to press, we note a cable despatch stating that Mons. Nieuport, the French aviator and inventor, has died from his injuries which were inflicted when his monoplane crashed to the earth on September 15th, at Verdun, France. It seems that the machine was caught in a gust of wind and driven from its course.

AEROPLANE TESTING APPARATUS.

The Aeronautic Institute at St. Cyr, near Paris, which is a branch of the University of Paris, has installed a complete set of apparatus for testing aeroplanes, and conducting experiments with air.

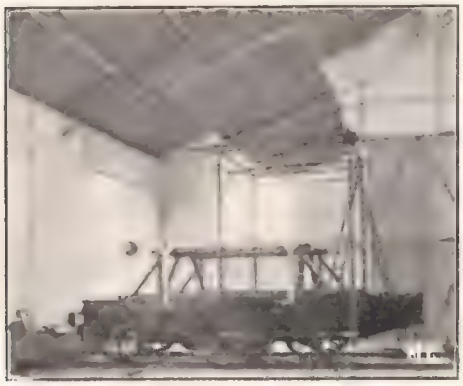


Fig. 1.

Fig. 1, shows a small motor driven truck, which travels over a 0.8 mile track at high speed. The track is shown in Fig. 2, and it will be noted that there are two rails on either side of the usual rails, to conduct the current to the motor. A pilot house situated at one portion of the field, controls the speed of the car. Different plane surfaces are mounted on the special frame work of the car, and deli-

Fig. 2.

cate instruments register the lifting force, and other data.

Fig. 3, shows a powerful electric blower, equipped with special shutters, so that any kind of wind may be produced. The air pressure and speed are measured by special instruments. Small models can be tested in the adjustable wind, and thus the same con-

Fig. 3.

ditions as would be experienced in actual flight are artificially brought about.

A NEW USE FOR AEROPLANES.

A young naval officer has suggested a new employment for aeroplanes. He states that the great difficulty in long distance bombarding with large guns, is to ascertain whether the shells fall short of the mark, or over the mark. He suggests that aeroplanes equipped with wireless telegraph apparatus be despatched so as to hover over the enemy, and signal to the home battery, the effects of the shots. For instance, the aeroplane scout could flash to the gunners, "Short by 300 yards," etc., according to his observation.

THE DURATION RECORD FOR 1911.

Great activity has been centered in the efforts of various aviators to break the endurance record, for sustained flight. Among the latest attempts, the foremost are, the remarkable flight of Marcel Loridan, on July 21st, when he flew 450 miles in 10 hours and 43 minutes. Jules Vedrines flew for almost 11 hours, and covered the remarkable distance of 497 miles. Eugene Renaux on August 7th, covered the distance of 558.9 miles in exactly 12 hours, making the greatest record thus far. It might be noted that French aviators have always held the record at the end of each year, with the exception of 1908, when the Wright brothers made their early exhibitions. These flights are made ac-

cording to the set rules, which state that if the machine comes in contact with the earth, even for an instant, the flight is considered terminated. Of all aeronautic demonstrations, the sustained flights are probably developing the qualities which will produce the perfected type.

AEROPLANES USED FOR INVASION.

From reliable sources, it is claimed that the monarchists of Portugal, are preparing on Spanish soil, for a new attack on their country, in hopes of resetting the exiled king on his throne. It is said that the army numbers 4,000 to 5,000 thoroughly equipped with the best ordnance, and including a fleet of skilled aviators and aeroplanes.

MODEL AEROPLANES.

Model flying the last year has become a popular and progressive sport among young America. Many clubs and organizations are devoted to the sole purpose of advancing the science of model aeroplane construction and flight. A few words, therefore, on this subject, would be both timely and interesting.

Model aeroplanes in most cases, never exceed 3 feet in their largest proportions. However, some models have been constructed as large as 8 feet long, and carrying small gasoline power plants. Most models derive their motive power from twisted rubber bands, for while clock work has been tried, it has proven unsuccessful. Models can be simply constructed, all the materials being obtainable from the many supply houses handling such goods. On the other hand, completed models are sold which successfully fly, at but a slight cost. In the next issue, we hope to have a good description of a model aeroplane with complete drawings as well.

Many contests are held by the model aeroplanists. At the present time, these contests are invariably held out-of-doors. In the earlier contests, the meetings were held indoors in the large armories, but the models have been developed to such a point, that a straight-way flight far exceeds the length of the building. The records for model flights to-day are quoted as, 1,691 feet for the American record, and 2,700 feet for the English record. The American record was made at Van Cortlandt Park by a young man, Cecil Peoli. He is a newcomer in the field, and his victory over more experienced experimenters is therefore noteworthy. Twining, the well-known English experimenter, claims that he has often made flights of one-half, and even three-quarters of a mile, with rubber driven models, but with the wind helping them. With the large gasoline motor models, flights of one mile and over have been made in France. These models can make flights of five minutes' duration, for usually ten minutes are used in "tuning" the engine.

The greatest difficulty encountered with aeroplane models, is to keep them in a straight course while in flight. The models usually twist and turn, making the actual distance flown far in excess to that credited for the flight. The distance is always given in a straight line from the starting point. Inter-school and even inter-state competitions are being planned. One has but to witness such a competition to experience the excitement and interest accompanying a keen race. In fact, the model flights become almost as alluring as the man-carrying competitions, even though the element of human danger is not at stake. Then again, looking at these competitions from a scientific point of view, it may be well to recall that the Wright Brothers, the pioneers of the aeroplane world, began their early experiments with such models. These miniature flying machines are continually bringing forth new points, which are adopted in the full size machines.

It is but a step from the model to the actual machine, for the impetuous inoculated into the youths, later develops itself into a commercial utility, either as constructor, or aviator. It is safe to predict, that the amateurs of to-day, will be the constructors and aeroplanist of the future.

A NEW ALTITUDE RECORD.

On September 5th, the world's altitude record was broken by Roland Garros, the French aviator at Parame, France. He ascended a height of 4,250 meters, or

(Continued on Page 450.)

World Radio History

Wireless Telegraph Contest

Our Wireless Station and our Laboratory Contest will be continued every month until further notice. The best photograph for each contest is awarded a monthly prize of Three (3) Dollars. If you have a good, clear photograph send it at once; you are doing yourself an injustice if you don't. If you have a wireless station or laboratory (no matter how small) have a photograph taken of it by all means. Photographs not used will be returned in 30 days.

PLEASE NOTE THAT THE DESCRIPTION OF THE STATION MUST NOT BE LONGER THAN 250 WORDS, AND THAT IT IS ESSENTIAL THAT ONLY ONE SIDE OF THE SHEET IS WRITTEN UPON. SHEET MUST BE TYPEWRITTEN OR WRITTEN BY PEN. DO NOT USE PENCIL. NO DESCRIPTION WILL BE ENTERED IN THE CONTEST UNLESS THESE RULES ARE CLOSELY ADHERED TO.

It is also advisable to send two prints of the photograph (one toned dark and one light) so we can have the choice of the one best suited for reproduction.

This competition is open freely to all who may desire to compete, without charge or consideration of any kind. Prospective contestants need not be subscribers for (the publication) in order to be entitled to compete for the prizes offered.

FIRST PRIZE THREE DOLLARS.

I ENCLOSE a picture of my wireless station which consists of the following:

Receiving: Two 75 ohm single pole receivers of ordinary telephone style, on headband, and microphone detector which was made by myself. I use seven Edison-Lalande batteries on

this detector, single-slide tuning coil three inches diameter and eight inches long, also made by myself.

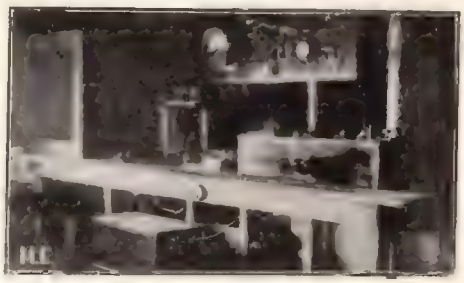
Sending: I use a key, condenser and transformer, which I manufactured myself. It has galvanized iron core three-quarters of an inch square and 11x18 inches. Primary consists of 37 turns on one leg of square wire No. 8; secondary is composed of 25 sections, 2,000 turns each, of No. 34, S. S. C. I get a 2¼ inch spark from this. Helix is made from five No. 14 wires twisted together to form a cable, wound on cardboard tube. Spark gap is on top. Aerial is of the two wire type on 150 foot tower about 300 feet long. I get good results with this set. I have several times heard the station at Hillcrest, San Francisco, using 15 k.w. This is 125 miles overland. I sometimes send to a friend here in town, but he does not get me very loudly as I am only using 6 or 7 amperes. I come in louder when I use about 15 amperes, but neither of us can receive very well. I built all the instruments from articles in *Modern Electrics*, which I find is a great help.

RUDOLF HARRIS.
California.

HONORABLE MENTION.

Herewith is a photograph and description of my wireless telegraph station.

At the top of the picture, is the switchboard, on which is mounted a



hot-wire ammeter, a battery voltmeter, kick-back spark gap, and necessary switches.

On the table, at the extreme left, are the condensers and rack, consist-

ing of twelve glass plates, 22 inches square. Next, to the right, are the helix and spark-gap, the latter a Murdock product. Next are the receivers, 3,000 ohm Murdock's. Next is the break key, consisting of a heavy, specially made wireless key, operating necessary contacts, the whole mounted on a mahogany base.

The receiving box is of mahogany, and holds the following instruments. From left to right are the mineral detectors, consisting of a Murdock silicon detector, mounted together with a ferron detector on a hard rubber base, an E. I. Co.'s rotary potentiometer, a large rotary variable condenser, a Massie sealed-point electrolytic detector, and a loading coil. In the box are held a fixed condenser and a loose coupler. The slides for operating the latter are shown at the front of the box.

Under the table is a one k.w. transformer, open core type.

My aerial is 45 feet high, 100 feet long composed of six wires on nine foot spreaders, the whole erected on a hill 90 feet high.

ELLERY W. STONE,
California.

HONORABLE MENTION.

Enclosed please find photograph of my wireless station.

My receiving set consists of two detectors, one silicon, one universal, a double slide tuner, variable condenser, and E. I. Co.'s 1,000 ohm phone.

My sending set consists of a one-half inch coil, helix, plate glass condenser, spark gap and key.

My aerial consists of four aluminium wires, No. 14, 60 feet long and 50 feet high.

The above instruments not including the phone, coil and key, I made myself.

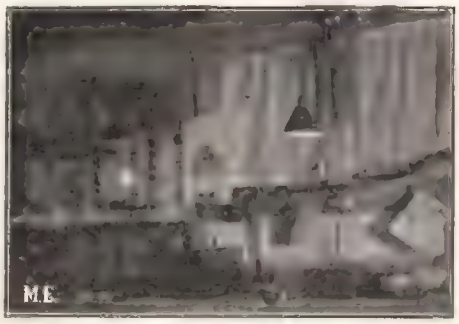
Besides my wireless, I have a great deal of experimental apparatus some of which is seen in the picture.

I am a regular reader of *Modern Electrics* and enjoy it very much.

HERBERT JESMAN,
Conn.

HONORABLE MENTION.

Here is a photograph of my wireless station. The spark in the centre



of the helix is seen very plainly and is obtained from a one-half k.w. transformer operated by 110 volts and 6 amperes. The condenser rack holding 12 plates 10x12, is home-made as also is the transformer, the secondary terminals of which are seen very plainly. The aerial switch is of a somewhat unusual design as it closes the primary current, opens the ground, and shorts the detector, all in one throw. Naturally it breaks the leads to the receiving set at the same time. An anchor gap is of course necessary to accomplish all this.

The receiving set is portable as the box seen in the foreground is a complete outfit in itself, consisting of inductive tuner, silicon detector, condensers, and loading coil. 2,000 ohm receivers are used.

The variable condenser shown is not included in the regular set as I find that with a loading coil on one lead of the aerial which, by the way, consists of six strands of copper wire 60 feet high and 125 feet long, is quite sufficient.

The key is not seen very clearly but has dimes for contacts. With this set

I have been able to receive about 1,500 miles and send up to 50 as far as I can judge, besides local work in and around here.

R. C. BODIE,
Canada.

HONORABLE MENTION.

Enclosed you will find a photograph of my much prized wireless station.

The transmitting outfit (to the right) consists of an E. I. Co. one inch spark coil and a telegraph key, the rest I have made with the help of *Modern Electrics,* which consists of a spark gap (on top of the helix), a helix, two glass plate condensers, and two

Leyden jars (on the bottom shelf).

A double pole double throw switch connects this with the receiving outfit which is to the left. I use a tuning coil sixteen inches long, wound with No. 24 enameled wire with an E. I. Co. slider, a fixed condenser, two silicon detectors, and a carbon detector.

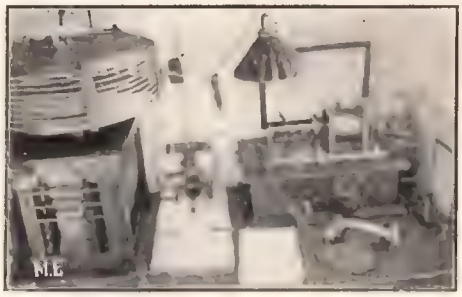
My aerial is a four wire aerial 35 feet long and 40 feet high, the spreaders are 10 feet long.

I know no other book to be of such help in wireless work as *Modern Electrics.*

HERBERT BUTCHER,
New Jersey.

HONORABLE MENTION.

Enclosed please find photograph of my wireless station. The sending outfit on the left is composed of a one-quarter k.w. transformer, high tension condensers, home-made helix of No. 8 aluminium wire, and E. I. Co. regular



telegraph key.

The receiving outfit mounted on a box is all of E. I. Co. make; namely, loose couple transformer, variable condenser, 2,000 ohm phones, circular potentiometer, electrolytic detector (hanging from ceiling), and a home-made perikon detector. The aerial is 115 feet long, four wires No. 14 aluminium, one and one-half feet apart and 68 feet high on one end and 15 feet on the other. I have two copper plates three feet square, buried in a swamp for the ground. With this outfit I have transmitted 90 miles in daylight, and received 700 miles.

JOHN MATTERS,
New York.

HONORABLE MENTION.

Enclosed please find photograph of my wireless station. The transmitting

set consists of one heavy telegraph key, one E. I. Co. transformer coil, one helix, one glass plate condenser,

and one spark gap with zinc electrodes. Power is taken from a six volt storage battery.

The receiving set consists of one loose coupled tuner, one fixed condenser, one crystal detector, and 1,000 ohm Brandes phones.

My aerial is forty feet high and one hundred feet long, consisting of five copper wires spaced two and one-half feet apart.

I am a member of the W. A. O. A. and get excellent results with this station.

CHARLES BROWNELL,
New Jersey.

Book Review.

ANALOGIES BETWEEN BATTERY CURRENT AND WATER FLOW.

A very interesting little book, of 20 pages, and with many illustrations, has been published by the National Carbon Co., of Cleveland, O., and which may be obtained free by our readers on application to that company.

Many who work with electricity, and particularly those who handle dry cells and are not versed in electrical terms generally, are confused by the technical names employed in describing current. Acting on this knowledge, of the lack of simple explanations, describing the different electrical terms and units, the booklet has been published. It compares all the electrical terms with the flow of water. This makes explanations simple and very easily understood. All readers who are not quite sure as to the meaning of certain electrical terms, would be well repaid for sending for the above mentioned book.

MULTIPLEX TELEPHONY AND TELEGRAPHY.

By George O. Squier, Major, U.S.A. Signal Corps.

Published by the Government Printing Office, Washington, D. C. Contains 102 pages, and is profusely illustrated with both wiring diagrams and photographs. This book may be obtained by the same procedure as the other government publications are handled.

As its title implies, this book thoroughly covers the new discovery of the author, whereby it is predicted that modern telephone engineering will be revolutionized. The diagrams and the intricate reading matter thoroughly cover the invention, so as to give the reader a complete understanding of the entire subject.

NEW ALTITUDE RECORD.

(Continued from Page 446.)

equivalent to 13,945 feet, in a Bleriot monoplane. This eclipses the record made by Beachy at Chicago by over 2,365 feet.

THE LATEST MICHELIN RECORD.

We note a cablegram from France stating that Ellen, a comparatively unknown French aviator, has broken the endurance record by flying in a Nieuport 14 hours and 7 minutes, covering the distance of 776.86 miles. However, we are not informed whether this is a non-stop flight. The Michelin Cup contest allows stops to be made this year, for replenishing the supply of gasoline.

LONG DISTANCE TELEGRAPH LINES.

The increasing of the distance in telegraphic communication has been remarkable. A few years ago, the longest distance connected in one circuit was between New York and New Orleans, and when conditions were favorable, Galveston was connected in. Improvements in the apparatus and lines have made it possible to span the continent from coast to coast.

In former times it was necessary for men to take down the messages at the ends of the separate lines, and re-transmit the messages manually. At the present time, though the line is divided into separate circuits with repeaters, the operation is entirely automatic, and avoids both excessive labor as well as avoiding the errors which occur with operators repeating the messages. The time saved is likewise an important factor, for every second counts in the transmission of despatches.

Flying Sparks

FISHING—

Has its pleasures—

As well as its disappointments.—Pêle-Mêle.

A PLEASANT RENDEZVOUS.

"Excuse me, but are youse de gent what is waiting for Miss Eulalie Miller?"

"Yes, I am."

"Could youse please have a little more patience then? As soon as it stops raining de lady says she will come."—Fliegende Blaetter.

A POINT OF VIEW.

(Both at the same time):—"Heavens, what an ugly creature!"—Figaro.

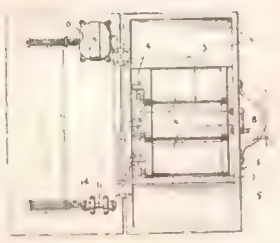
WHAT IS GOOD FOR THE GOOSE—

IS GOOD FOR THE GANDER.

—Mondo Umoristico.

Electrical Patents for the Month

1,002,435. COIL WINDER. PETER OSWALD ALMA SOLT, Filed Apr 24 1911 Serial No 623 115



A coil winder comprising a portable casing having therein a series of compartments, a battery arranged in one of said compartments a cover adapted to close the casing a motor arranged on the inner side of one end of the cover and connected to said battery, said motor having its shaft reversible and adapted to receive tool chucks or a coil core whereby said chucks or core is received, a switch to control the current to said motor, a bearing sleeve secured to the inner side of the opposite end of the cover, and a shaft revolubly mounted in said sleeve and adapted to receive and revolubly support a coil or spool from which the wire is unwound and wound onto the core on said motor shaft, said motor and sleeve being arranged to fit into compartments in said box when the cover is closed.

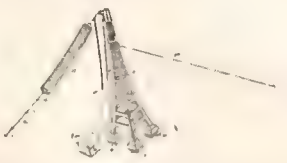
1,003,634. INDUCTION COIL. JOHN MCKEVAR, Jersey City, N. J. Filed Oct. 24, 1908. Serial No. 459,281.

1. In combination, a non-rotatable contact bar for an induction coil, and manually controlled means carrying the said contact bar and arranged axially therewith to move the non-rotatable contact bar in the direction of its length.

1,002,062. ELECTRICAL SIGNALING. REGINALD A. FESSENDEN, Brant Rock, Mass., assignor to National Electric Signaling Company, Pittsburg, Pa., a Corporation of New Jersey. Filed Dec 23, 1907. Serial No 407,749.

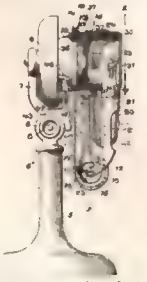
1. In a system of electrical signaling, a transmitter comprising a self responsive good contact of different materials, means for varying the pressure of the contact by means of the impulses to be transmitted, a local circuit containing the contact and an indicating mechanism.

1,002,951. SIGNALING BY ELECTROMAGNETIC WAVES. REGINALD A. FESSENDEN, Washington, D. C., assignor to National Electric Signaling Company, Pittsburg, Pa., a Corporation of New Jersey. Filed Feb 8, 1907. Serial No. 356,384.



1. The combination of an insulated ferro-concrete antenna support and an ant-una arranged to prevent said support from absorbing electromagnetic waves received.

1,001,845. TELEPHONE. ARTHUR G. RANDALL, Philadelphia, Pa. Filed Sept 7 1910. Serial No. 580 822.

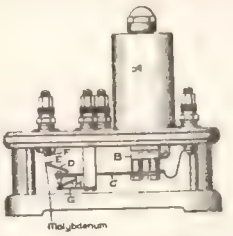


1. In a telephone, a transmitter having a mouthpiece, an arm movable on the mouthpiece, a receiver connected to said arm and movable with respect thereto, means for locking the receiver and arm together, and means for locking the movable arm on the transmitter mouthpiece and simultaneously unlocking the receiver to permit of its movement to operative position.

1,002,735. AUTOMATIC TELEGRAPH-KEY CLOSER. HORACE K. MOTZ and FREDERICK B. HATFIELD, La Jara, Colo. Filed Oct 4, 1910. Serial No. 585,252.

In a telegraph key of the character described, a base, a key lever mounted thereon, a secondary lever consisting of a resilient arm located above the key lever, and having its inner end formed with an open ended slot straddling an adjustable set screw at the inner end of the key lever, and also having an oblong narrow slot straddling a second adjustable set screw adjacent to the contact of the key lever, and having a depending contact projection normally in contact with the base to close the circuit thru the outer end of said secondary lever having a finger projection raised above the button of the key lever, and operable therefrom by the insertion of the finger of the operator of the key lever, and held in elevated position to open the circuit during the operation of the key lever.

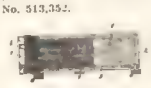
1,002,048. RELAY CONTACT. FRED B. COBB, Schenectady, N. Y., assignor to General Electric Company, a Corporation of New York. Filed Sept 3, 1909. Serial No. 516,071.



1. A relay contact made of molybdenum.

2. A relay contact made of malleable molybdenum.

1,003,374. WAVE-DETECTOR FOR WIRELESS TELEGRAPHY. WILHELM SCHLOEMILCH, Berlin, and PAUL FERNAND PICHON, Steglitz, near Berlin, Germany, assignors to Gesellschaft für drahtlose Telegraphie M. B. H., Berlin, Germany, a Corporation of Germany. Original application filed Apr 14, 1906. Serial No 311,678. Divided and this application filed Aug 17, 1909. Serial No. 513,352.



1. A wave detector for wireless telegraphy consisting of two contact bodies touching each other with a predetermined pressure, one of which consists of copper pyrites.

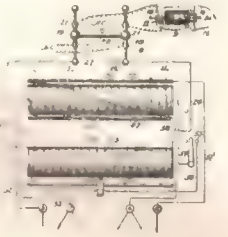
1,002,050. RECEIVER FOR SIGNALING. REGINALD A. FESSENDEN, Washington, D. C., assignor to The National Electric Signaling Company, Pittsburg, Pa., a Corporation of New Jersey. Filed Apr 11, 1904. Serial No. 202,666.

1. A receiver for wireless signaling having in combination two parts or members, one of said members being of a yielding nature, means for continuously changing the point of contacts of said members, and means for selecting signals of a definite group frequency.

1,003,210. WAVE DETECTOR FOR WIRELESS TELEGRAPHY. WILHELM SCHLOEMILCH, Berlin, and PAUL FERNAND PICHON, Steglitz, near Berlin, Germany, assignors to Gesellschaft für Drahtlose Telegraphie M. B. H., Berlin, Germany, a Corporation of Germany. Filed Aug 17 1909. Serial No. 513,351.

1. A wave detector for wireless telegraphy which operates without the aid of an electromotive force consisting of two contact bodies of different material and of self-restoring character, one of which consists of galena.

1,003,676. ELECTROTHERAPEUTIC DEVICE. JULIUS B. WANTZ, Chicago, Ill., assignor to Victor Electric Company, Chicago, Ill., a Corporation of Illinois. Filed Oct 21, 1909. Serial No. 523,774.



1. In combination, a rotary cylindrical electric resistance formed to present a circumferential endless zigzag contact, and a pair of circuit terminals bearing respectively against different sides of said contact, the points of engagement between said terminals and contact being shifted in opposite directions back and forth along said resistance by the turning of the latter in one direction.

1,001,932. TIME LIMIT CIRCUIT-CLOSER. FRED B. COBB, Schenectady, N. Y., assignor to General Electric Company, a Corporation of New York. Filed Mar. 5, 1909. Serial No. 481,471.

1. A time-limit circuit closer comprising a pivotally mounted receptacle, a conducting fluid therein, a partition dividing the receptacle into two chambers and provided with a large opening and a restricted opening through which respectively the fluid flows from one chamber to the other when said receptacle is moved, one of said chambers having a plurality of branches, one branch being located to receive the flow direct from the openings, and a plurality of independent sets of contact terminals in said branches adapted to be connected successively by the flow of fluid into said chamber.

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RESISTANCE OF TELEPHONE RECEIVERS.

(1038.) Leland A. Reinhold, Pa., enquires:

Q. 1.—Are telephone receivers of 5,000 ohms resistance practical in wireless, or would phones of 2,500 resistance be better?

A. 1.—Telephone receivers rank in sensitiveness according to many factors, of which the resistance is only a mere issue. The most important factors are, that the distance from diaphragm to pole pieces be correct, that the diaphragm be of sufficient thinness and yet be in proportion to the strength of the magnetism, and lastly, that the ampere turns be the highest possible. Elsewhere in this issue, is an article covering the factors which constitute a good receiver. If the 5,000 ohm receiver has a greater number of ampere turns than the 2,500 ohm receiver, it will be far more sensitive. On the other hand, if the 2,500 has more ampere turns, it will be more sensitive than the higher resistance phone. It often happens, that the lower resistance phones are more sensitive, for the higher resistance ones contain more turns than needed.

Q. 2.—What is the best method to run a 2-inch coil on alternating current, using the vibrator of the coil?

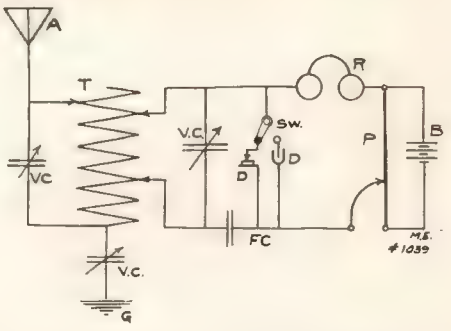
A. 2.—We would recommend the use of a small step-down transformer such as used for bell wiring. These transformers will reduce the 110 volts A.C. to perhaps 8 volts, with little loss. The cost is slight, and the operating expense far less than batteries.

MOTORS USED ON BOTH A.C. AND D.C.

(1039.) Edgar Hunnicutt, Jr., Ga., asks:

Q. 1.—Kindly give me diagram for the following instruments, three variable condensers, one fixed condenser, one electrolytic and silicon detector, one potentiometer, one three slide tuner, and one pair of receivers.

A. 1.—We give below the correct diagram.



Q. 2.—What are the best dimensions for a three slide tuner using 1280 feet of No. 20 enameled wire?

A. 2.—We would suggest that the coil be at least 5 inches in diameter, and of suitable length to accommodate the wire.

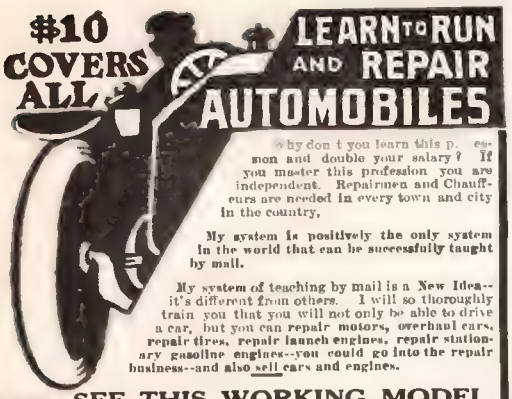
Q. 3.—Why is it that motors wound for D.C. will run as well on A.C.?

A. 3.—The reason is due to the fact that in the series type of D.C. motors, inasmuch as the same current must flow through the field and armature windings, the magnetism will be reversed at the same instant, therefore producing a neutral effect, and the motor is operating under the same conditions as if D.C. were employed. All small motors will operate on A.C. or D.C.

STICKING OF VIBRATOR CONTACTS.

(1040.) Joseph Hapgar, Conn., states:

Q. 1.—I have bought a 1 inch coil and sometimes the vibrator sticks. What can I do to remedy this trouble?



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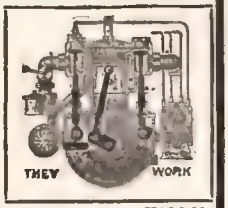

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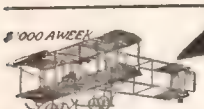

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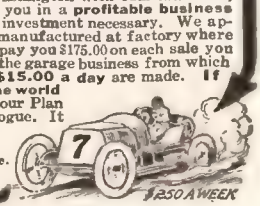

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A. 1.—The best procedure would be to take out the spring and screw parts, containing the contacts, and rub these on fine sand paper, until the contacts are perfectly smooth. Then moderate the number of cells you are using on the coil, for this difficulty is usually the results of over-loading the coil.

Q. 2.—How many plunge batteries should be used on a 1 inch coil?

A. 2.—Taken for granted that your cells are of the bichromate type, it will require four cells to operate the coil to its full capacity.

GAS LIGHTING COIL.

(1041.) G. H. Gaus, Mass., states:

Q. 1.—Could you please tell me briefly how to make a coil which may be used with the automatic system of gas lighting?

A. 1.—A primary gas lighting coil, for use on systems employing a wipe spark, we would recommend a coil made as follows; a soft iron wire core, 10-inches long and ¾-inches in diameter, upon which is wound eleven layers of No. 14 D.C.C. wire, each layer being 9 inches long. This coil will produce a heavy thick spark when operated on four or more dry cells.

SPARK COIL.

(1042.) Steinway, L. I., ask:

Q. 1.—What size spark should I get from this coil; Core 1⅞x10, of No. 14 D. core wire. Primary, 3 layers of No. 14 D. C.C. Secondary, 4 lbs No. 30 S.C.C. in 20 sections ¼-inch thick? Heavy fibre tubing between the primary and secondary windings.

A. 1.—A spark of 3 inches should readily be obtained.

Q.2.—What would be the dimensions of a primary, and a secondary condenser? What primary voltage should be used?

A. 2.—The primary condenser of 2,000 sq. in. of tin-foil. The secondary condenser should be made of 18 sheets of glass, 8x10 inches, in one multiple unit. The primary voltage will be about 10 volts for best results.

Q. 3.—Which is more desirable for wireless telegraph work, a closed core or an open core transformer, and why?

A. 3.—The closed core is more efficient, and it is a more economical instrument than the open core. However, the closed core produces a peculiar sounding spark, while a perfect spark, without a lagging hiss, may be obtained from the open core. For this reason, the open core is preferred by many. It is safe to state, that a properly adjusted closed core transformer will give better satisfaction than most open core transformers.

THE EIFFEL TOWER STATION.

Q. 1.—Is the Eiffel Tower wireless in

(1043.) Geo. Hulsterman, N. Dak., aks: Paris operated at the present time, and if so, for what purposes?

A. 1.—From what we are able to learn, the station is only operated for sending time signals to ships at sea. However, new apparatus is being installed and will

probably be employed for military operations.

Q. 2.—What is the average power used on the transmitting sets of most lake steamers on Lake Michigan and Lake Superior?

A. 2.—Most ships carry only ½ k.w. outfits, though some of the larger passenger liners carry 2 k.w. sets.

A ROTARY SPARK GAP.

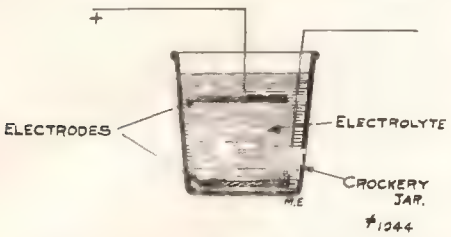
(1044.) Walter Gross, Ill., writes:

Q. 1.—As a reader of Modern Electrics," I noticed an article contributed by Clarence C. Hess on a musical spark gap. As there are no details about the construction of such a gap, I would like to know as much as possible about same. What material would be good instead of the 8 penny nails, if ½ k.w. is to be used on same?

A. 1.—The spark gap described by Mr. Hess, is very simply made, and for this reason he recommends nails. However, for the best results, a number of zinc plugs around the surface of the wheel would prove far better, especially where one-half k.w. or more is to be used.

Q. 2.—Would you please give information about a water rheostat, and what voltage can be obtained at its lowest power?

A. 2.—A water rheostat simply consists of a vessel filled with water and into which a few drops of conducting acid, or salt have been added, in order to increase the



conductivity. The current is passed through the solution by means of two electrodes of any suitable material, one of these being rigid, while the other may be moved near or further from the fixed one, thus varying the resistance of the solution. Any voltage can be obtained within wide limits, and it is possible to get lower voltages than even one volt, if the solution is not very conductive, and the plates are widely separated. We are giving herewith a drawing of such a rheostat in its simplest form.

A FOUR INCH COIL.

(1045.) Edward Albett, N. J., writes:

Q. 1.—Would you please give the data on a 4 inch coil, and also state the meaning of "Pie."

A. 1.—The dimensions for a 4 inch coil are as follows; Length of core, 8¾in; diameter of core, 1 inch; number of primary wire, 16; number of turns for primary, 232; secondary wire, 36; weight of secondary wire, 2 pounds; number of "pies" in secondary, 8; diameter of secondary "pies," 4 inches; distance between coil heads, 6 inches; total area in square inches for prim-

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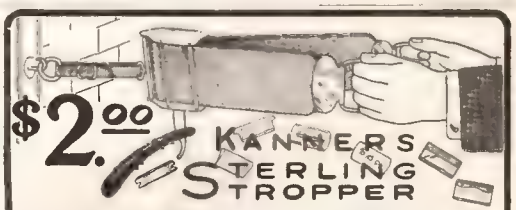

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ary condenser, 2,500. Number of batteries should be about 8 dry cells, giving about 12 volts. By "pies" we mean the separate insulated coil units, incorporated in the complete secondary.

Q. 2.—How must "pies" be connected?

A. 2.—"Pies" should always be connected so that the inside wire of one section, will be attached to the outside wire of the next section, and so on. A diagram below gives the correct idea, and it will be noted

that the current will flow in one direction through the entire length of the secondary sections.

Q. 3.—Can a rolled condenser be used?

A. 3.—A rolled condenser may be used, but is not as satisfactory as the type with flat sheets. The reason is probably due to the fact that there is an inductance influence in the rolled type.

AN INDEPENDENT VIBRATOR.

(1046.) Frank L. Tyree, Jr., W. Va., enquires:

Q. 1.—Please inform me where I can obtain an independent vibrator like the one described in the book, "Construction of Induction Coils," by H. Winfield Secor.

A. 1.—We would refer you to our advertising columns. Probably some of the wireless supply houses who advertise, may be able to furnish such apparatus.

Q. 2.—How is molybdenite mounted in a detector?

A. 2.—Molybdenite, according to the patent specifications of the discoverer, Mr. G. W. Pickard, should be clamped between non-conducting surfaces, under pressure and a brass point allowed to protrude through a hole of these surfaces and make contact with the mineral. It cannot be soldered except with great difficulty. The commonest method of using it, is by placing it between two flat discs.

A RECEIVING CONDENSER.

(1047.) Arthur Costigan, N. Y., states:

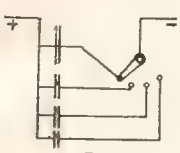
Q. 1.—Give dimensions of a good fixed condenser of the rolled type form for use in the secondary circuit of a loose-coupler. I wish to use tinfoil strips about 4 inches wide.

A. 1.—We suggest using two strips of tinfoil, 4 inches wide and 18 inches long, with a piece of paraffined paper between.

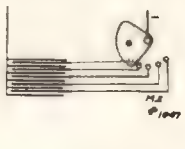
Q. 2.—Show how to connect an adjustable receiving condenser, so that the capacity may be changed by means of an ordinary switch.

A. 2.—It is impossible to our knowledge to change the capacity of a condenser by means of a regular point switch. The only method to employ if you wish to use such a switch, is to make a number of condenser units, each unit being larger than

its neighbor, as shown in sketch A. A clever idea is illustrated in the Experimental Department of this issue, where a long blade s.p. switch is used for closing a number of contact jaws, each connected to a sheet of the condenser. The easiest method, however, is to cut a piece of heavy sheet brass, into a semi-circular



-FIG. A-



-FIG. B-

form, with a handle placed in the center, so that it may be turned. The diagram shows the connections which may then be used. (Diagram B.)

Q. 3.—Is ferron considered more sensitive than silicon?

A. 3.—After exhaustive tests, ferron (iron pyrite) has been found more sensitive than silicon.

WINDING A SPARK COIL.

(1048.) Gail W. Palmer, Wis., asks:

Q. 1.—In winding the secondary of a 2 inch spark coil with 1 pound of No. 36 enameled wire in four sections, should insulation be placed between the layers?

A. 1.—Not necessarily, but it is recommended.

Q. 2.—The primary consists of 2 layers of No. 16 D.C.C. wire. Will a coil of such dimensions give a 2 inch spark, and if so, will it be between needle points or zinc spark rods?

A. 2.—Yes, this coil will give a 2 inch spark if properly made. This spark will be between needle points.

Q. 3.—Could I send 90 miles with this coil with proper apparatus and aerial?

A. 3.—Hardly. A distance of 50 miles would be very remarkable, but quite possible.

SEMAPHORE SIGNALS.

(1049.) Emil Letellier, Md., asks:

Q. 1.—Upon what system does the automatic semaphore block signals operate on railroads?

A. 1.—The two rails are used to carry the current, and each "block" is insulated from the next section, by insulating pieces inserted between the rails. The rails are also bonded to give better conductivity. A powerful electromagnet is installed in the base of the block signal, and in series with the two rails and a powerful set of wet cells. As the train passes over the section, the rails are short-circuited and thus permit the current to pass through the magnet and raise the semaphore signal. There are other systems employing heavy push contacts under the rails which are also very practical.

Q. 2.—Are any of the eastern railways equipped with same, and if so name a few?

A. 2.—Probably the greater part of the

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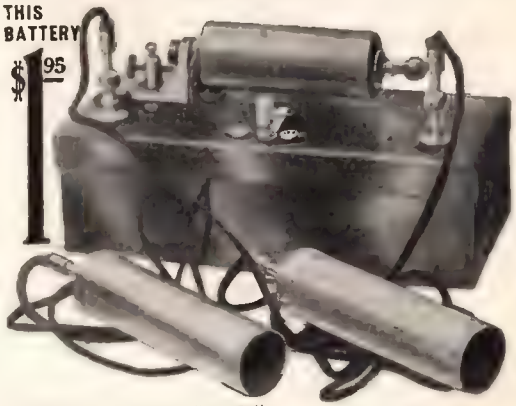

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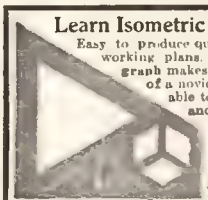

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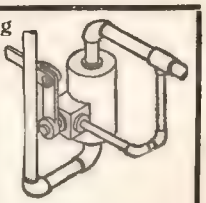

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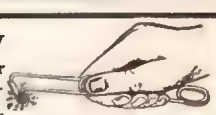

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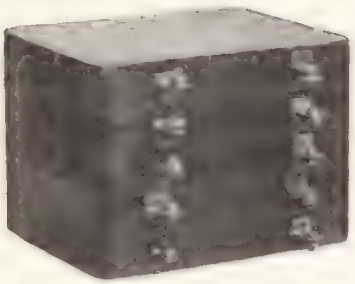

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better roads are thus equipped. The Pennsylvania and the Lehigh Valley routes are equipped with such service from New York to Buffalo. The Long Island, New York Subway, New York Central, Lackawanna, and many others employ the automatic block signals.

Q. 3.—Upon what principle does the electric head light for locomotives work, and how installed?

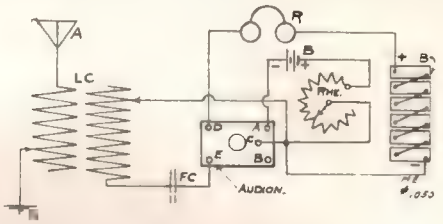
A. 3.—Some western railroads employ electric arc head lights on their steam locomotives. The outfit consists of an electric arc apparatus, self regulating, installed in the head light with suitable reflector. In back of this head light, a small turbine engine directly coupled to a dynamo, is mounted on the boiler between the smokestack and the head light. These lamps will readily light one mile of track ahead of the locomotive.

THE AUDION DETECTOR.

(1050.) Mitchel Meister, Me., wishes:

Q. 1.—Connections for the "Electro" type of audion.

A. 2.—We are giving you below the connections for the audion mentioned, in



connection with a loose coupler.

Q. 2.—How many cells should be used on this audion for both circuits?

A. 2.—The high voltage circuit, containing the telephone receivers should have at least 25 volts (= 6 flashlight batteries) for the best results. The circuit for the filament should have four to six volts with a rheostat to regulate the current.

Q. 3.—Who is the original inventor of the audion for use in wireless telegraphy?

A. 3.—Probably Fleming is the first man to have suggested its use.

OPERATION OF STREET CARS.

(1051.) G. Levine, N. Y., enquires:

Q. 1.—How does a controller make the connections for the motors of an electric car?

A. 1.—The controller box is divided into two main connections, namely, running the motors in series, and then in parallel. The controller when moved around the first half of its circle, gradually cuts out the resistance in the circuit of the motors connected in series. As soon as it passes a certain point, however, the motors are reconnected in parallel, and the resistance is again cut out by degrees, until both motors are left in the circuit directly in parallel across the line.

Q. 2.—What form of resistance is used?

A. 2.—The resistance is in the form of grids, which are cast iron heavy plates

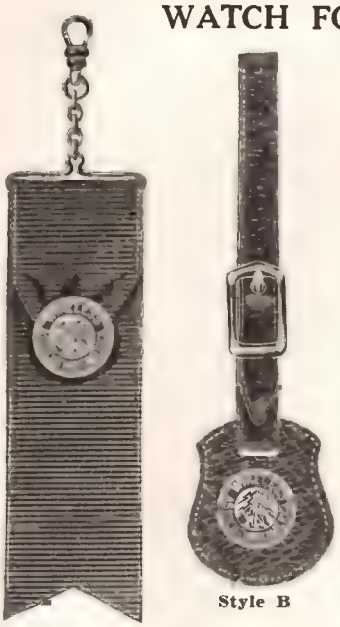
of a zig-zagging design, so that the current has to travel through the entire length of the iron sheet. A number of these grids are connected in series under the car by suitable frames.

Q. 3.—How are the lamps connected on cars, in view of the fact that the voltage is over 500?

A.3.—The lamps are usually connected in circuits of five units in series.

W. A. O. A.

WATCH FOBS



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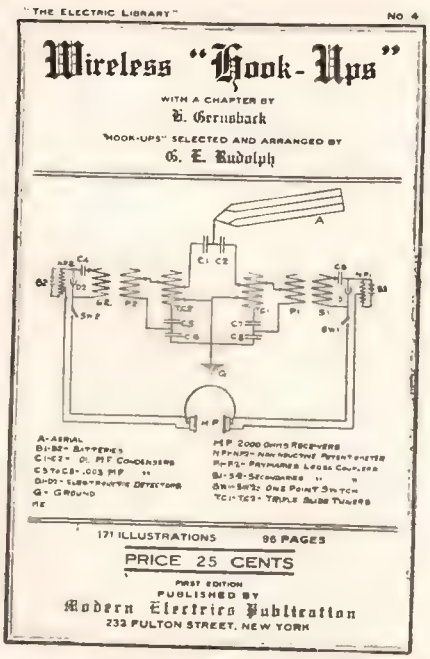

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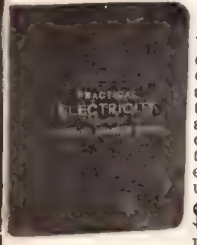

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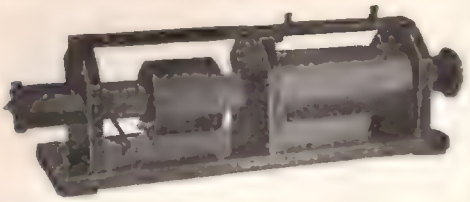

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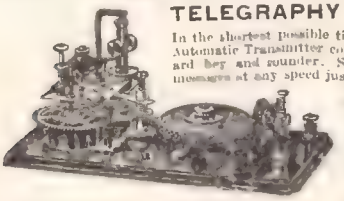

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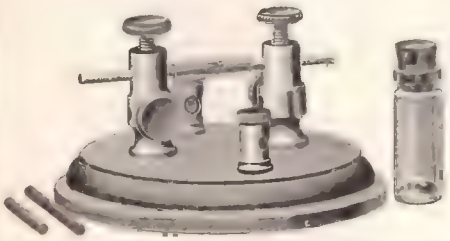

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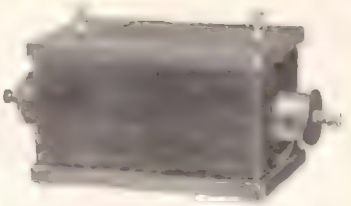

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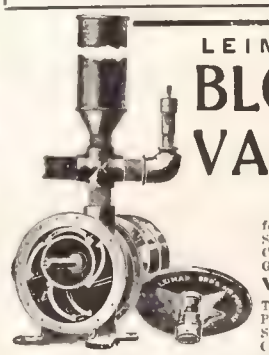

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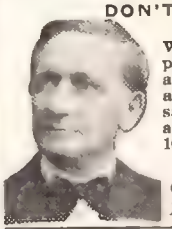

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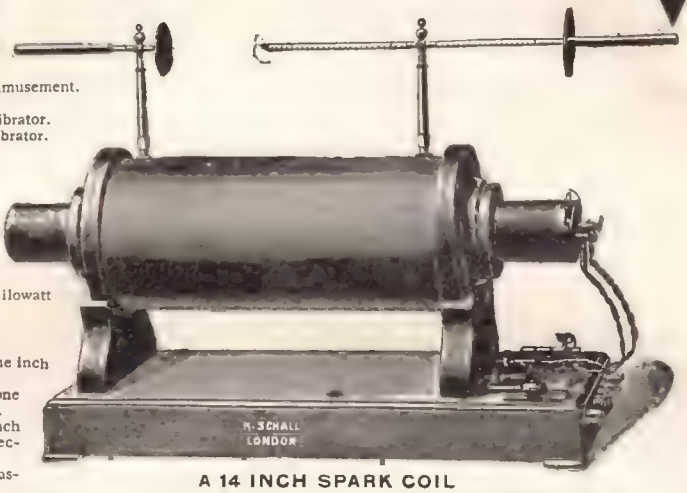

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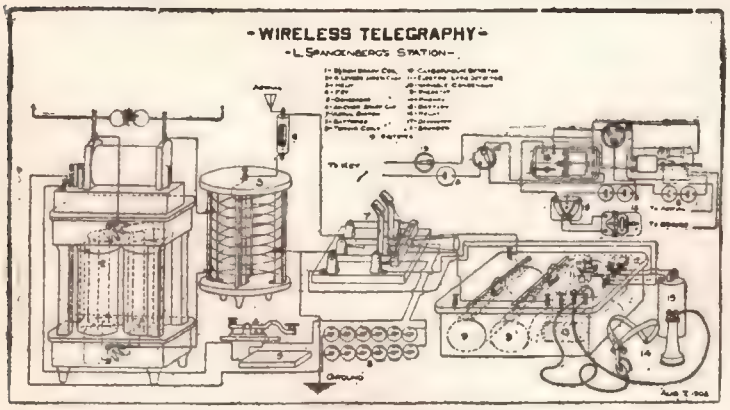

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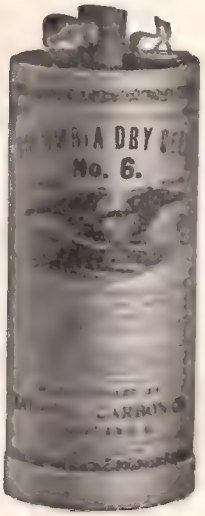

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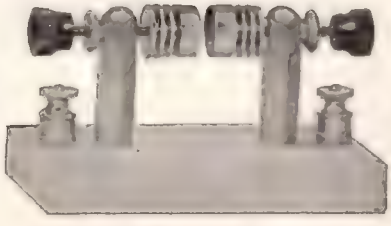

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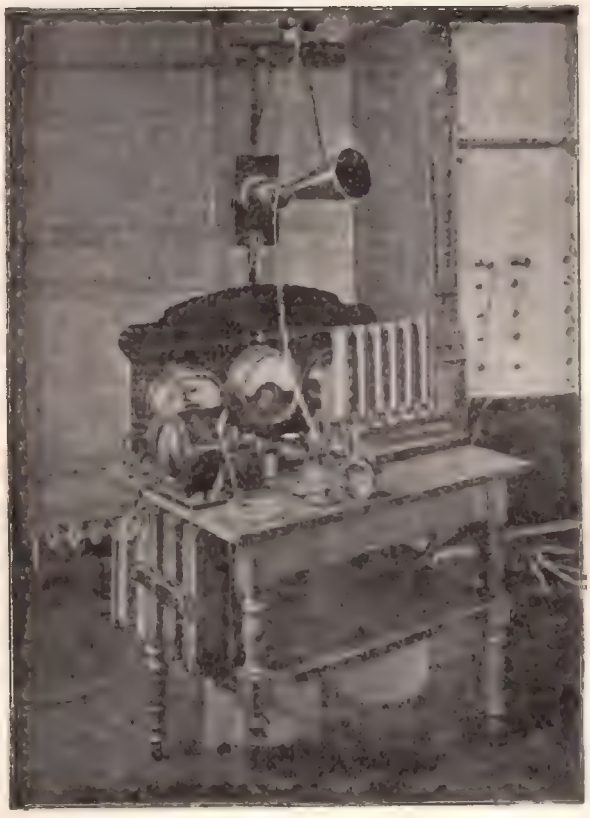

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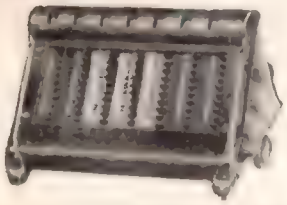

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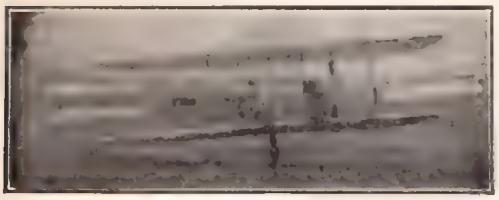

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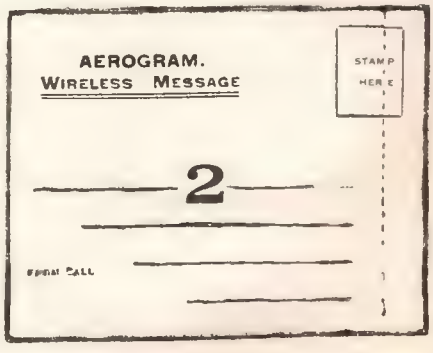

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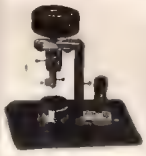

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Foreign wireless experts, invariably exclaim in wonder when viewing the photographs appearing in each month in the "Wireless Contest" of MODERN ELECTRICS. They cannot grasp the idea that boys 14 years old actually operate wireless stations successfully everyday in the year under all conditions but they are all of the undivided opinion that Young America leads the rest of the world wirelessly.

So far America has led in the race. The next thing is to stay in the front, and let others follow. In fact he would be a bold prophet who would even dare hint at the wonders to come during the next decade. The boy experimenting in an attic to-day may be an authority to-morrow.

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Headed by America's foremost wireless men, it is not a money-making institution. There are no membership fees, and no contributions required to become a member.

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World Radio History

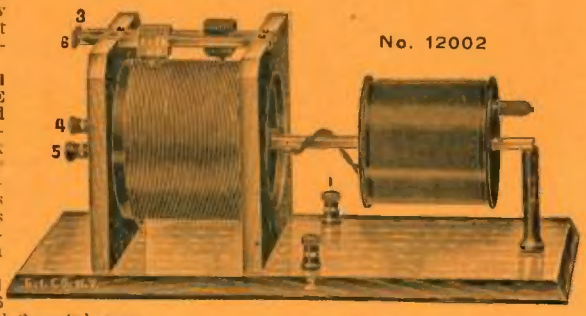
NEWS

THE "ELECTRO" LOOSE COUPLER. (New Style)

Pursuant to a large demand by our customers for a loose Coupler with a long style Secondary, we herewith present our New Style, which makes a very fine addition to our now extensive line of apparatus. The workmanship of this Coupler is the highest possible and not by spending twice the amount of money would it be possible for us to build a better instrument.

All wood parts are solid quartered oak, dark finish.

The PRIMARY wound with No. 22 is **BARE COPPER WIRE** wound by our patent process. The Instrument has our patent Hard Rubber composition sliders; one red and one black.



The SECONDARY has **solid hard rubber ends** and is **BARE WIRE** wound. Size of Wire is No. 28 B and S., and neat hard rubber handle is provided to slide the SECONDARY back and forward, and in order to do away with loose connections, we use a flexible cord as we have found that this is very much superior to sliding contacts which are always uncertain on an instrument of this kind especially on a SECONDARY.

ALL metal parts are nickel plated and highly polished. There are 6 binding posts; 4 hard rubber ones and 2 metal ones.

This instrument is the highest class possible grade and has several other improvements which our old style LOOSE COUPLER did not have. We can confidently recommend this instrument to any one and we will unhesitatingly refund the purchase price if it is not all and everything we claim for it.

Despite the fact that this instrument costs us fully 25 per cent. more to make than our old style, we have not raised the price although we ought to, in justice to ourselves.

This instrument is only made in **ONE STYLE**, namely 2 SLIDES; one slide type not being made.

Dimensions: Length of base 12 inches, width 6 inches, height over all 6½ inches; weight 2½ pounds.

NO. 12002 "ELECTRO" LOOSE COUPLER, 2 SLIDES, NEW STYLE. Price $4.00.

THE "ELECTRO" WIMSHURST STATIC MACHINE. (New Style.)

It is with the greatest pride that we introduce herewith A REAL STATIC MACHINE to the American Public.

The machine which we handled heretofore, and which was not our own product, was so flimsy and made so cheaply that we had to replace a lot of them and even refund the money as very often it entirely refused to work.

The machine we are presenting herewith is the acme of American Workmanship and built in our own shops. We have been working on this machine for over a year and we doubt whether we have ever turned out anything better than this machine.

There is not a particle of wood used on it whatever. The only materials entering into its construction are the following:

METAL, GLASS, and HARD RUBBER, nothing else whatever.

The machine which we handled previously had glass plates, 50 per cent. of which broke before they were delivered to our customer. The 7 inch plates, which we use now, are made of ELECTRITE and are all machine moulded with tinfoil sectors pressed right into the plates.

The base is Cast Iron as are the two wheels. The neutralizers are of steel, while the horizontal arm carrying the discharges is of hard rubber as are the discharge handles and the crank handle.

All Metal Parts are Nickel Plated and highly polished and guaranteed not to wear off for one year.

There are TWO PLATES revolving in opposite directions. **THE MACHINE IS GUARANTEED TO WORK IN ALL KINDS OF WEATHER,** and if directions are followed, success is always had. The spark in all cases being from 2½ to 3 inches.

We cannot recommend this machine too highly in all respects and will cheerfully refund the money or replace any machine that fails to come up to our representation in any respects whatever.

Our machine is shipped **FULLY ASSEMBLED** and we guarantee to deliver it in good shape and in working condition.

The size is 8 in. x 5 in. x 10 1-2 in. over all. The weight is 3 pounds.

This machine is guaranteed in all respects and there is nothing to be replaced as nothing can wear out and we will replace any part becoming defective, free of charge within one year if the machine has been treated with ordinary intelligence.

If you are interested in this machine, send at once for our new booklet giving a lot of experiments which can be performed with same.

The "Electro" STATIC MACHINE NO. 9000, NEW STYLE, as described, $3.75.

THIS PRICE IS THE INTRODUCTION PRICE AND WILL BE RAISED SHORTLY.

HAVE you a copy of our famous **196 Page Electrical Cyclopedia No. 9,** containing over **400 illustrations?** The most wonderful book ever printed, containing more information on **all electrical and Wireless subjects than a $3.00 text-book.** Send 4c postage today and we will promptly mail it. Postal cards NOT answered.

THE ELECTRO IMPORTING CO. 233-Z FULTON ST., NEW YORK

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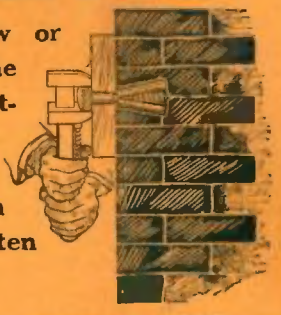
SEBCO EXPANSION BOLTS

For Fastening to Brick and Stone

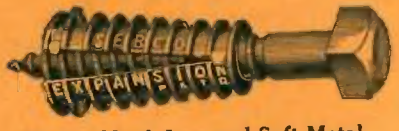
¶ Make a hole of the required size with a Sebco Drill.

¶ Place the Expansion in the hole.

¶ Run the screw or bolt through the article to be attached, then into the expansion and fasten tight.



Made of Non-Rusting Soft Composition Metal.



Made of both Iron and Soft Metal.

IT IS AS EASY TO USE SEBCO EXPANSIONS IN BRICK AND STONE AS IT IS TO USE SCREWS IN WOOD

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